

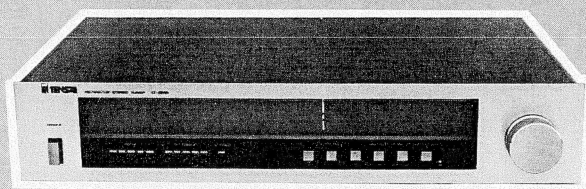
# Service Manual

**MODEL TT3245/TP2200/TM2250**

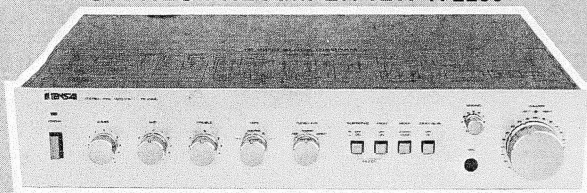
TUNER/PRE-AMPLIFIER/POWER AMPLIFIER



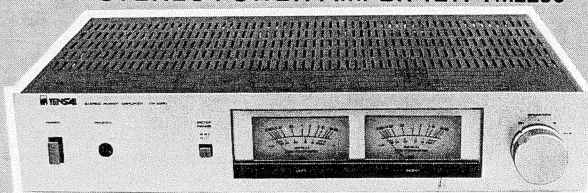
STEREO TUNER TT3245



STEREO PRE-AMPLIFIER TP2200



STEREO POWER AMPLIFIER TM2250



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Specifications are subjects to change without notice.

# MODEL TT3245

## 1. SPECIFICATIONS

### FM PERFORMANCE

Frequency Range	88 — 108 MHz
IHF Sensitivity at 98 MHz	1.9 $\mu$ V
Image Rejection at 106 MHz	50 dB
IF Rejection at 90 MHz	95 dB
Spurious Response at 98 MHz	80 dB
Bandwidth 1.0% THD, 1100 $\mu$ V at 98 MHz, 75 kHz dev.	
Wide Position	250 kHz
Narrow Position	200 kHz
S/N at 1100 $\mu$ V, at 98 MHz	70 dB
Fidelity $\pm 1$ dB, 1100 $\mu$ V at 98 MHz	20 — 15,000 Hz
Output Level at 1100 $\mu$ V 98 MHz, 75 kHz dev. (Fixed)	1V
Selectivity 100 $\mu$ V, $\pm 300$ kHz	
Wide Position	40 dB
Narrow Position	55 dB
Muting Level	20 $\mu$ V
Stereo Separation at 1100 $\mu$ V 98 MHz	
100 Hz	40 dB
1,000 Hz	40 dB
10,000 Hz	35 dB
Stereo THD, 1100 $\mu$ V at 98 MHz	
100 Hz	0.3%
1,000 Hz	0.3%
10,000 Hz	4.0%

### AM PERFORMANCE

Frequency Range	
MW	531 — 1620 kHz

LW	150 — 350 kHz
Sensitivity for 20 dB S/N	
MW at 1000 kHz	500 $\mu$ V/m
LW at 240 kHz	600 $\mu$ V/m
Image Rejection	
MW at 1400 kHz	40 dB
LW at 320 kHz	40 dB
IF Rejection	
MW at 600 kHz	32 dB
LW at 320 kHz	28 dB
Spurious Response at 1000 kHz	50 dB
Bandwidth at 1000 kHz	
-6 dB	7 kHz
-40 dB	22 kHz
ACA $\pm 10$ kHz at 1400 kHz	35 dB
AGC at 100 mV/m, 1000 kHz	50 dB
S/N	
MW at 1000 kHz, 5 mV/m	40 dB
LW at 240 kHz, 10 mV/m	40 dB
Fidelity -6 dB at 5 mV/m	30 — 2,500 Hz
Output Level at 5 mV/m 1000 kHz, 80% Modulation	1.3V

### GENERAL

Power Source	AC 220 to 240 Volts 50 Hz $\sim$
Dimensions	430(W) x 80(H) x 250(D) mm
Weight	5 kg

## 2. DISASSEMBLY INSTRUCTIONS

### (1) Top cover removal

Remove four screws on both sides of the set and lift up the top cover.

### (2) Bottom cover removal

Remove two screws around the center of the bottom cover lift up the cover.

### (3) Front panel removal

Remove a tuning knob.

Remove five screws (A) from top and bottom as shown in Figure 1 and 2, and the front panel can be removed with push buttons.

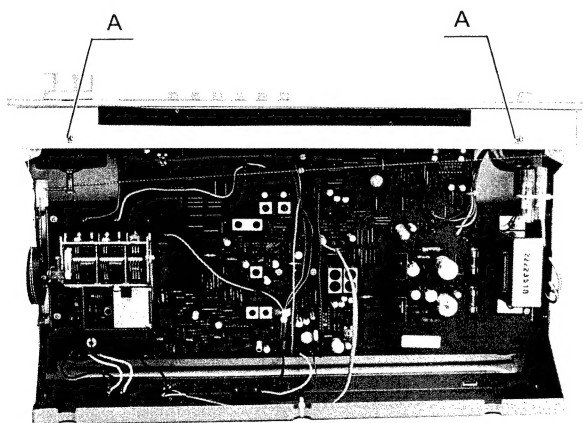


Figure 1

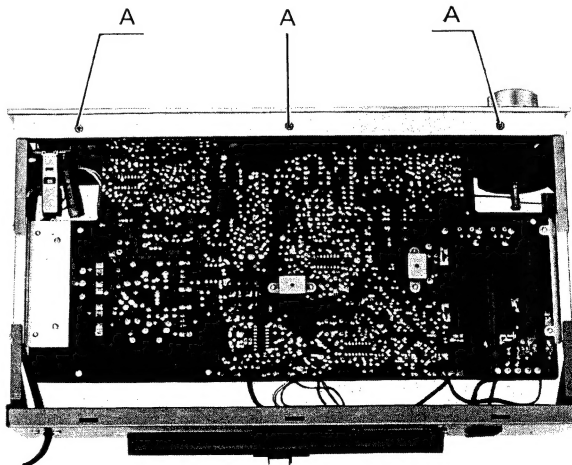


Figure 2

### 3. DIAL CORD STRINGING

- (1) Set the tuning capacitor to the maximum capacitance (fully counterclockwise position).
- (2) Wind the dial cord in the numerical sequence as shown in Figure 3.

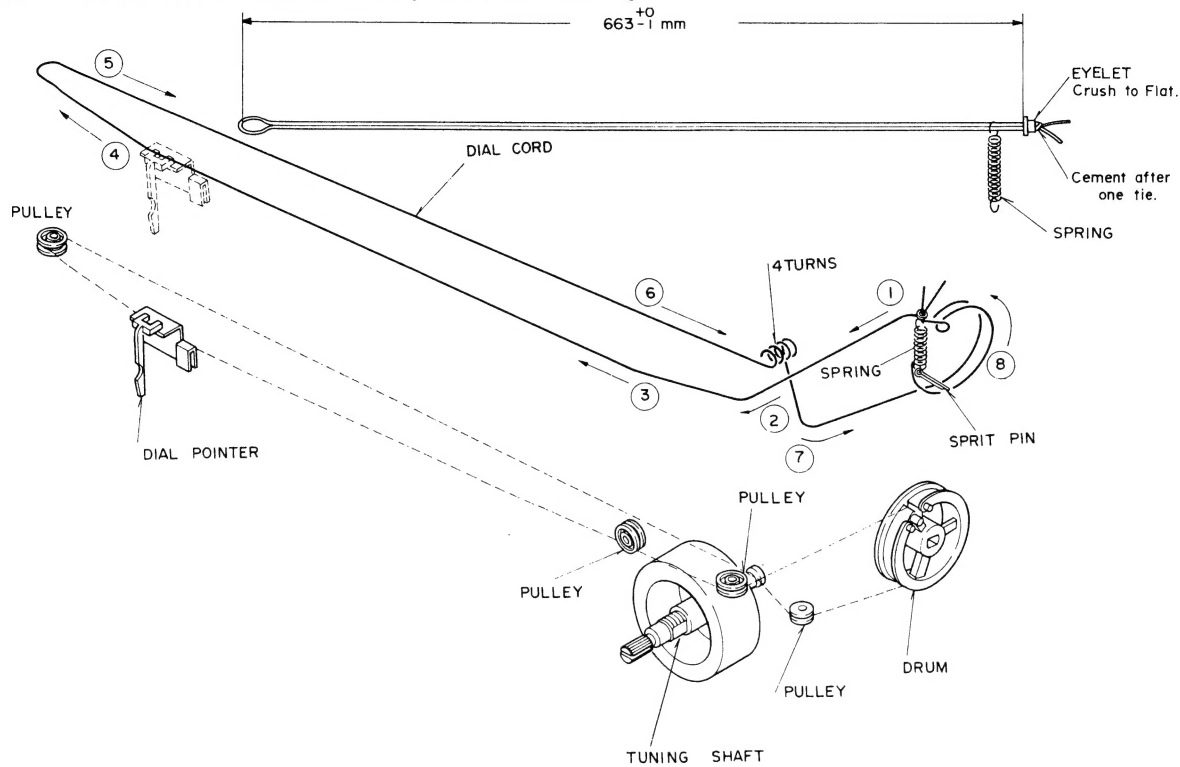


Figure 3

### 4. ALIGNMENT INSTRUCTIONS

#### AM ALIGNMENT

##### TEST EQUIPMENTS

- (1) Signal generator with a frequency range of at least from 145 kHz to 2.6 MHz for AM.
- (2) VTVM.
- (3) Test loop.

##### NOTES:

- (1) During alignment, keep the signal generator output at the lowest level where the set is sensible of signal.
- (2) Ground connection of signal generator ... to chassis ground.
- (3) "Tuning gang fully clockwise" means minimum capacitance position.

##### MW ALIGNMENT

- (1) Connect test equipments as shown in Figure 4.
- (2) Push the MW button.
- (3) Generator modulation ... 400 Hz 30%.
- (4) Proceed as outlined in the TABLE 1. MW ALIGNMENT CHART.

TABLE 1. MW ALIGNMENT CHART (For alignment points, see Figure 5.)

Item	Step	Signal Generator Frequency	Dial Setting	Meter Connection	Adjusting Point	Adjusting Level
IF	1	455 kHz	Tuning gang fully clockwise	Output terminal L ch or R ch	IFT203 IFT204	Adjust for maximum



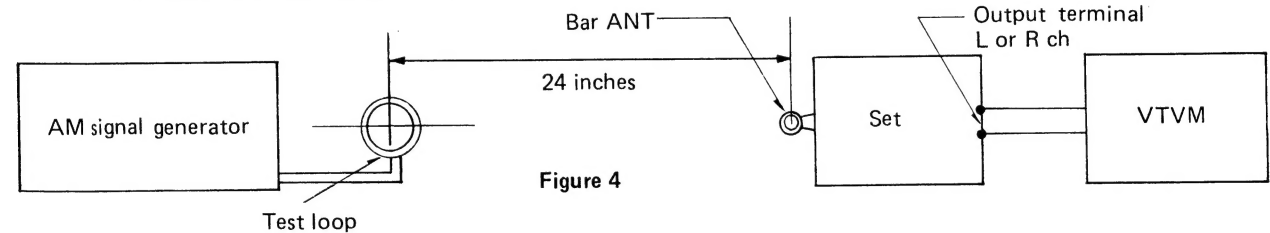
Osc. Freq.	2	510 kHz	Tuning gang fully counter-clockwise	Same as step 1	L103	Same as step 1
	3	1650 kHz	Tuning gang fully clockwise	Same as step 1	TC103	Same as step 1
	4	Repeat steps 2 and 3 as required.				
RF Tracking	5	600 kHz	Tune to signal	Same as step 1	L102-a (MW)	Same as step 1
	6	1400 kHz	Tune to signal	Same as step 1	TC101	Same as step 1
	7	Repeat steps 5 and 6 as required.				

LW ALIGNMENT

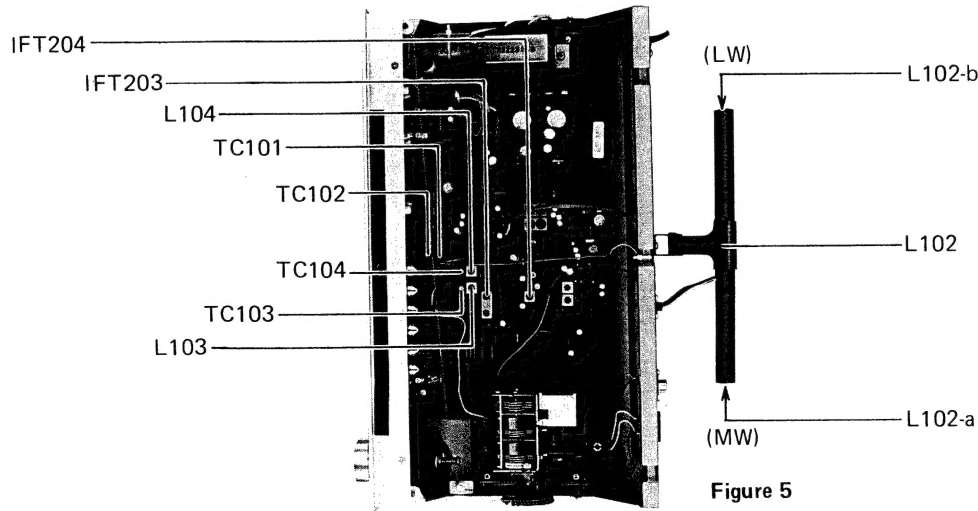
- (1) Connect test equipments as shown in Figure 4.
- (2) Push the LW button.
- (3) Generator modulation ... 400 Hz 30%.
- (4) Proceed as outlined in the TABLE 2. LW ALIGNMENT CHART.

TABLE 2. LW ALIGNMENT CHART (For alignment points, see Figure 5.)

Item	Step	Signal Generator Frequency	Dial Setting	Meter or Connection	Adjusting Point	Adjusting Level
Osc. Freq.	1	145 kHz	Tuning gang fully counter-clockwise	Ouput terminal L ch or R ch	L104	Adjust for maximum.
	2	370 kHz	Tuning gang fully clockwise	Same as step 1	TC104	Same as step 1.
	3	Repeat steps 1 and 2 as required.				
RF Tracking	4	170 kHz	Tune to signal	Same as step 1	L102-b (LW)	Same as step 1.
	5	340 kHz	Tune to signal	Same as step 1	TC102	Same as step 1.
	6	Repeat steps 4 and 5 as required.				



ALIGNMENT POINTS



## FM ALIGNMENT

### TEST EQUIPMENTS

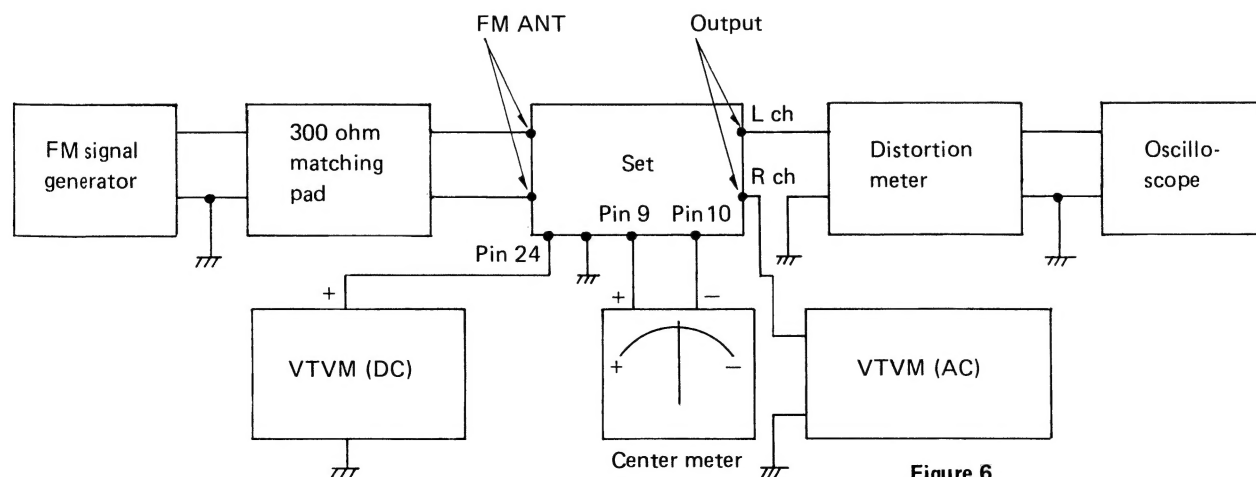
- (1) Signal generator with a frequency range of at least 85 MHz to 150 MHz (FM).
- (2) Distortion meter.
- (3) Oscilloscope.
- (4) VTVM.
- (5) Center meter.
- (6) FM dummy antenna (300 ohm).

### ALIGNMENT

- (1) Connect test equipments as shown in Figure 6.
- (2) Push the FM button.
- (3) Set the MUTING switch to OFF (⬇).
- (4) Generator modulation .. 1 kHz (75 kHz dev.)
- (5) Proceed as outlined in the TABLE 3. FM ALIGNMENT CHART.

**TABLE 3. FM ALIGNMENT CHART (For alignment points, see Figure 9.)**

Item	Step	Signal Generator	Dial Setting	Adjusting Point	Adjusting Level
IF	1	No signal output	————	IFT201	Center on the center meter
	2	98 MHz (1mV)	Tune to signal	IFT202	Adjust for minimum distortion
	3	Repeat steps 1 and 2 as required.			
Tuning Ind.	4	98 MHz (1mV)	Tune to signal	SVR401	Adjust for $-100\text{mV} \pm 20\text{mV}$ on VTVM (DC)
Rec. Level	5	98 MHz (1mV)	Tune to signal	SVR203	Adjust the indication on VTVM (AC) when REC LEVEL switch is "ON", should be a half level ( $-6\text{dB}$ ) compared with indication when REC LEVEL switch is "OFF".
Osc. Freq.	6	87.2 MHz ( $10\mu\text{V}$ )	Tuning gang fully counterclockwise	Lo on Block-FM	Adjust for maximum indication.
	7	108.4 MHz ( $10\mu\text{V}$ )	Tuning gang fully clockwise	TCo on Block-FM	Same as step 6
	8	Repeat steps 6 and 7 as required			
RF Tracking	9	90 MHz ( $2\mu\text{V}$ )	Tune to signal	La, Lr	Same as step 6
	10	106 MHz ( $2\mu\text{V}$ )	Tune to signal	TCa, TCr on Block-FM	Same as step 6
	11	Repeat steps 9 and 10 as required.			



**Figure 6**

# FM STEREO ALIGNMENT

## TEST EQUIPMENTS

- |                         |                       |
|-------------------------|-----------------------|
| (1) FM signal generator | (4) Oscilloscope      |
| (2) FM stereo modulator | (5) Frequency counter |
| (3) VTVM                | (6) FM matching pad   |

## NOTE:

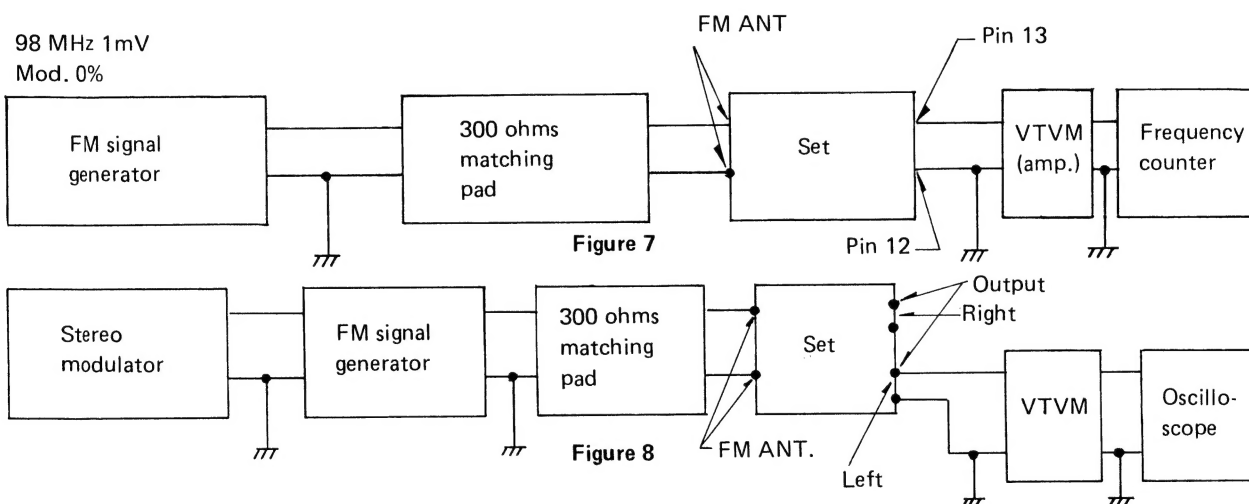
- (1) Set the deviation meter by the signal of L = R and switch mode desired.

## ALIGNMENT

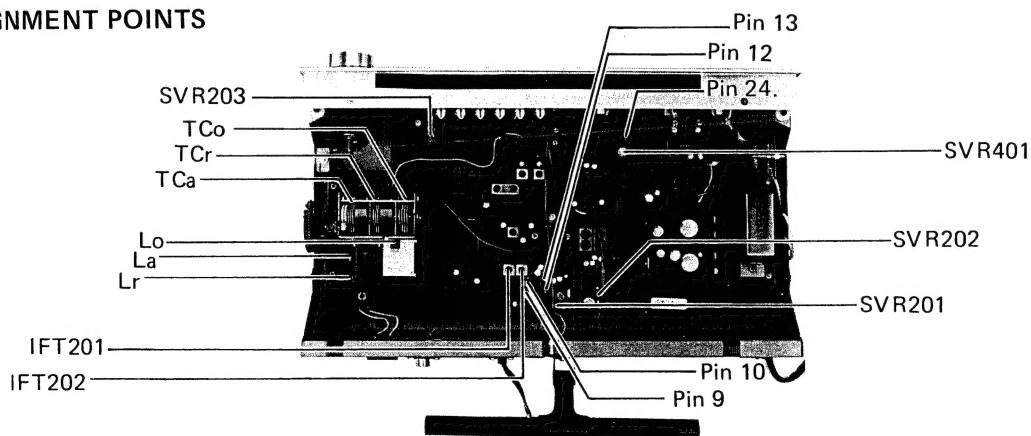
- (1) Connect the equipments as shown in Figure 7 or Figure 8.  
 (2) Set the MUTING switch to ON (■).  
 (3) RF signal input should be about 60 dB (1mV).  
 (4) Set the turning gang to a quiet point on dial.  
 (5) Proceed as outlined in the TABLE 4. FM STEREO ALIGNMENT CHART.

TABLE 4. FM STEREO ALIGNMENT CHART (For alignment points, see Figure 9.)

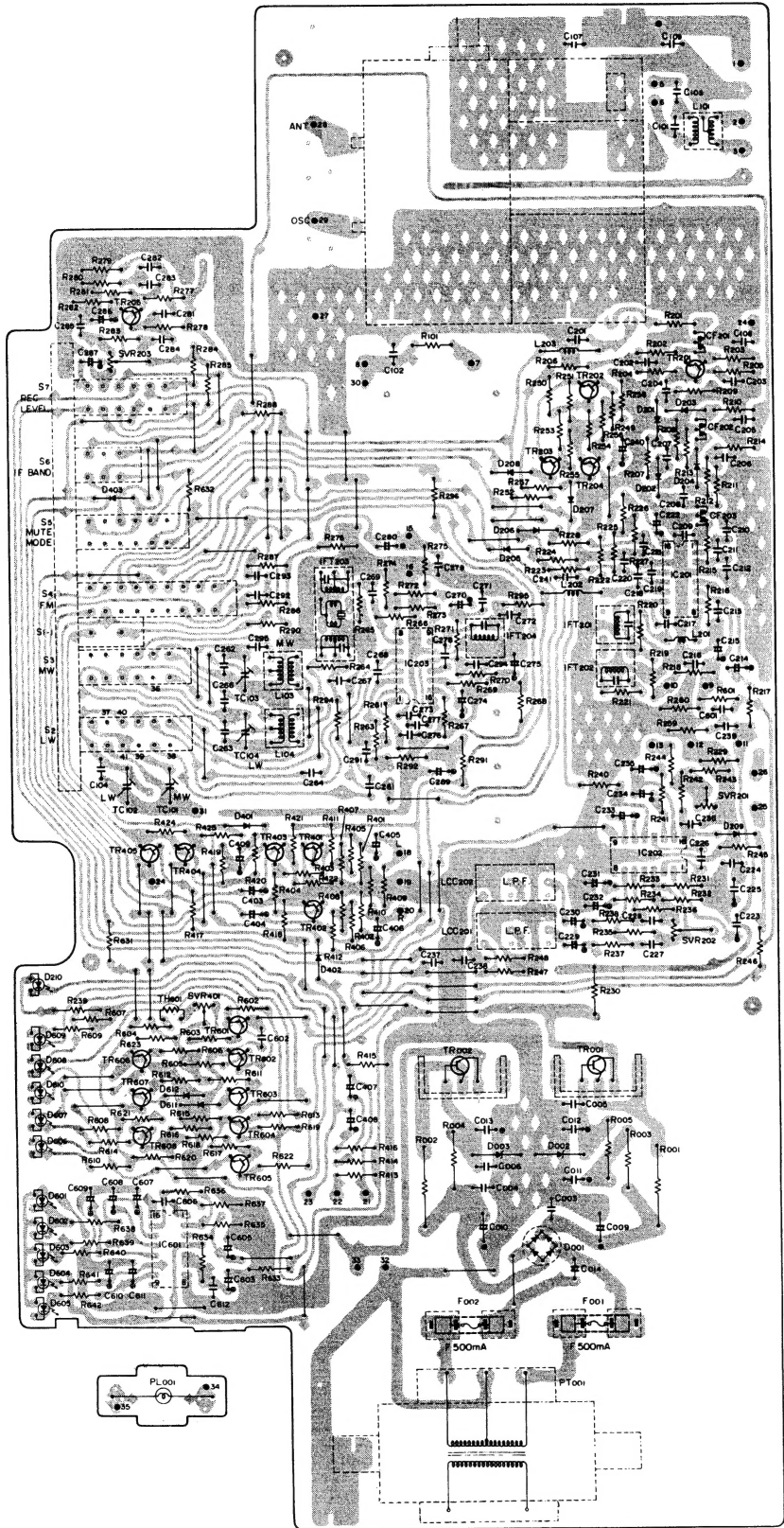
Item	Step	Modulation Frequency	Modulation Mode Setting	Modulation Level Setting	Adjusting Point	Adjusting Level etc.	Connection
VCO Adj.	1	—	—	0%	SVR201 slightly	76.0 ±0.076 kHz	Figure 7
Sep. Adj.	2	1000 Hz	Stereo Rch with pilot	90% (Main & Sub) (67.5 kHz dev.) 10% (Pilot) (7.5 kHz dev.)	SVR202 (slightly separation)	Adjust for minimum.	Figure 8



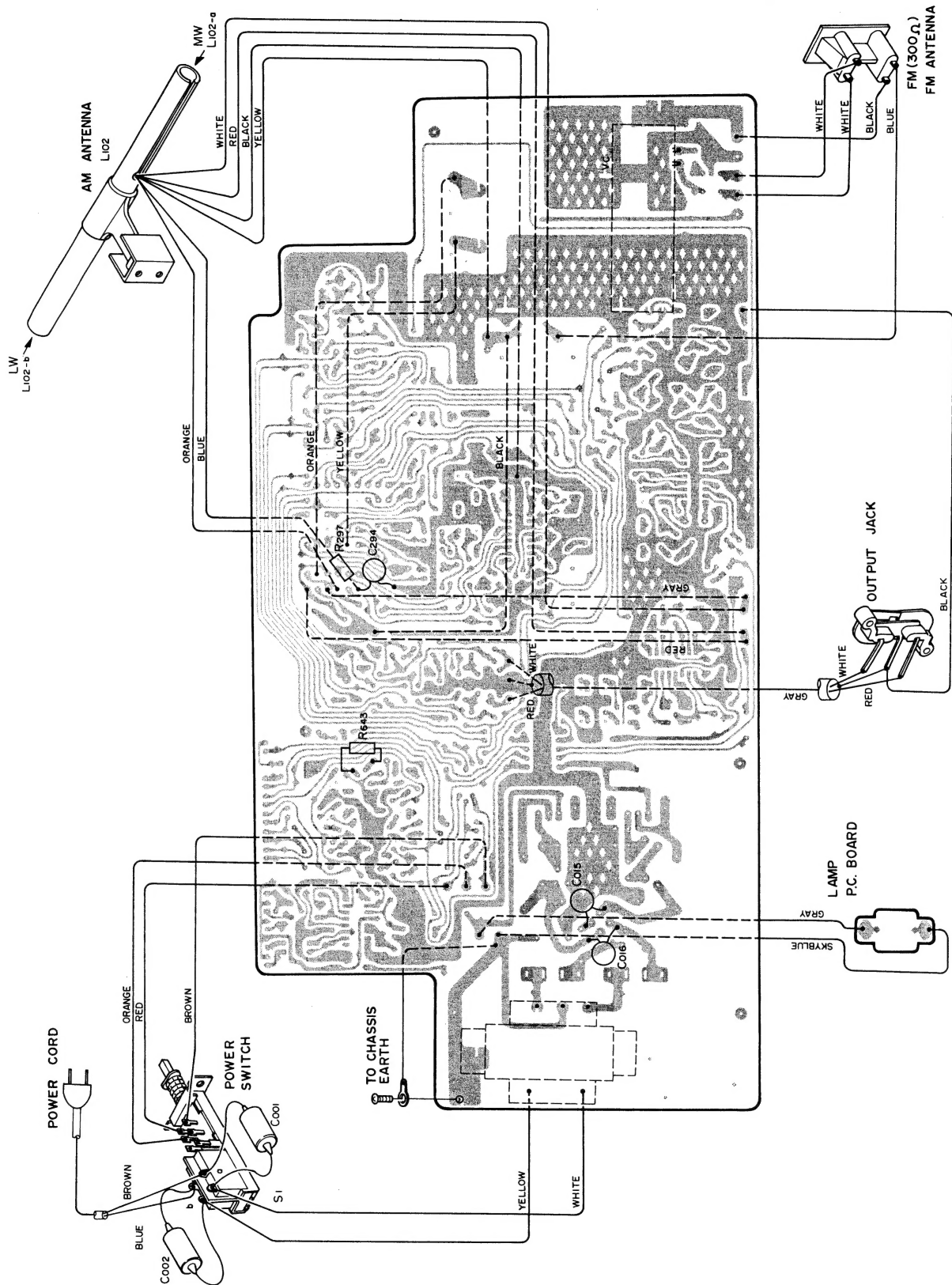
## ALIGNMENT POINTS



# 5. PRINTED CIRCUIT BOARDS BOTTOM VIEW

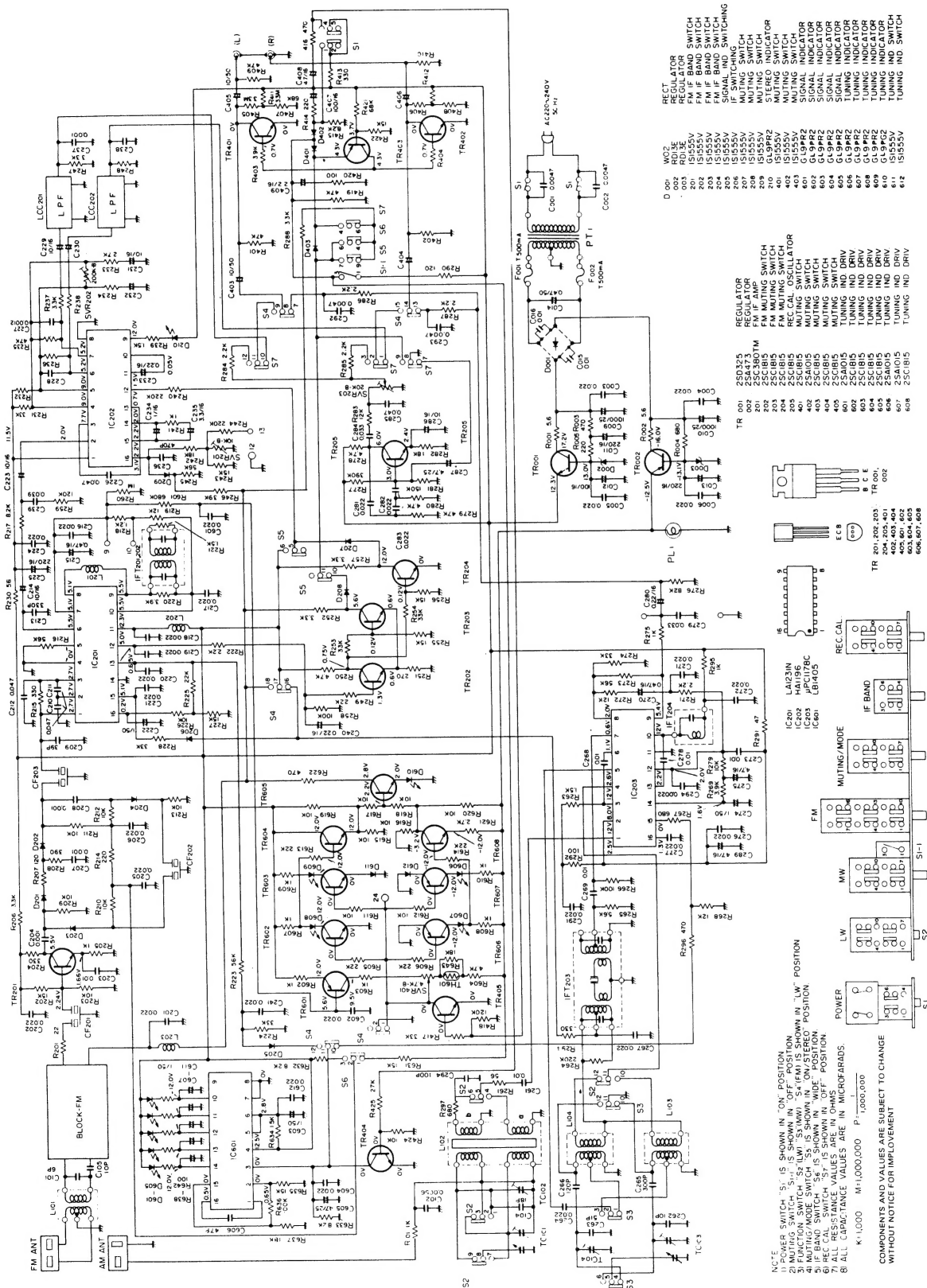


# BOTTOM VIEW OF P.C.B. AND WIRING



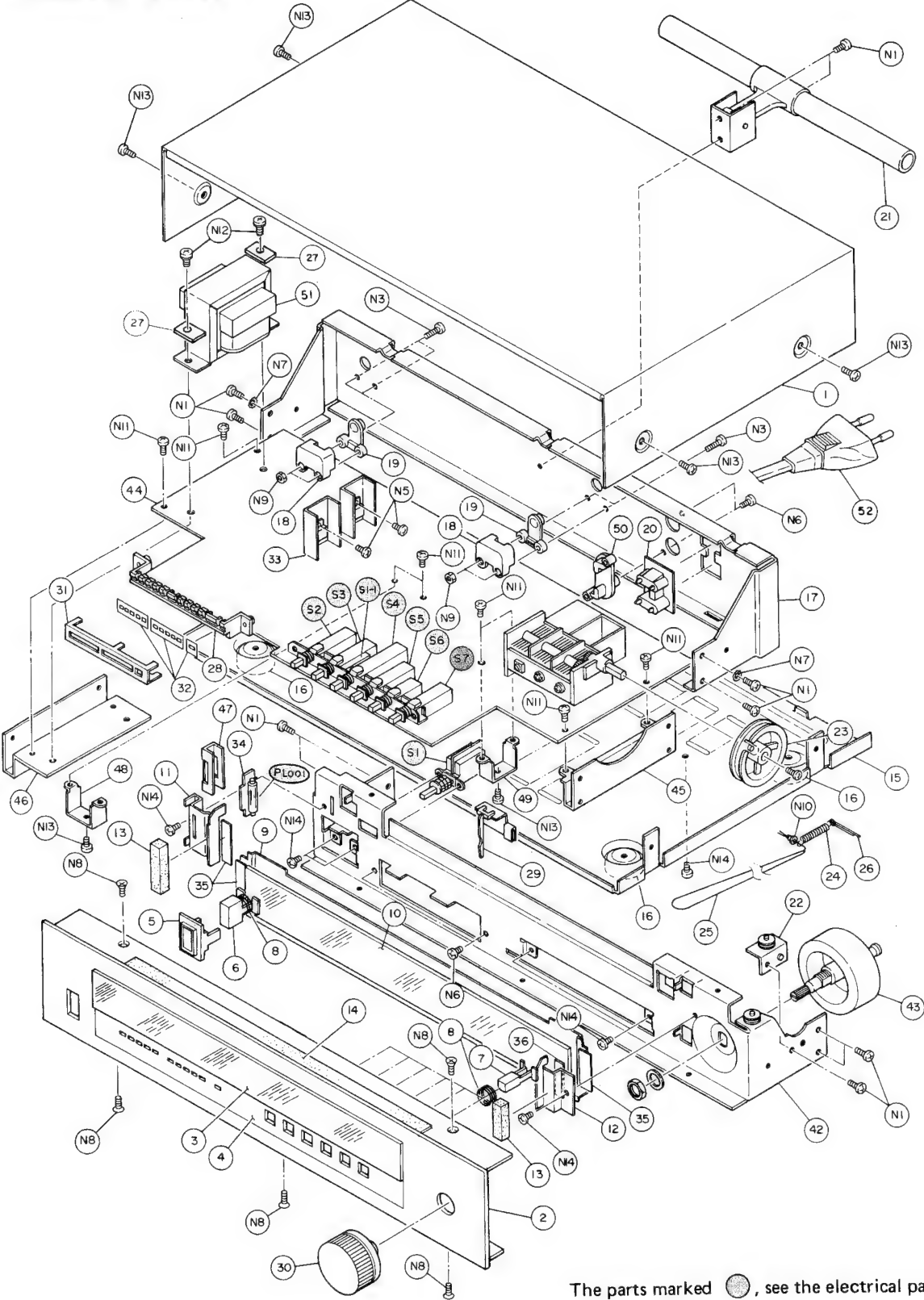



# 6. SCHEMATIC DIAGRAM



# 7. EXPLODED VIEW AND PARTS LISTS

## EXPLODED VIEW



The parts marked , see the electrical parts list.

# **PARTS LIST**

## **ELECTRICAL PARTS**

Symbol No.	Part No.	Description
<b>ICs</b>		
IC201	22114700	IC, LA1231
IC202	22114586	IC, HA1196
IC203	22114726	IC, $\mu$ PC1178C
IC601	22114769	IC, LB1405
<b>TRANSISTORS &amp; DIODES</b>		
TR001	22114478	Transistor, 2SD325-E
TR002	36500740	Transistor, 2SA473-Y
TR201	36707940	Transistor, 2SC380TM-O
TR202	36317460	Transistor, 2SC1815-GR
TR203	36317460	Transistor, 2SC1815-GR
TR204	36317460	Transistor, 2SC1815-GR
TR205	36317460	Transistor, 2SC1815-GR
TR401	36317480	Transistor, 2SC1815-BL
TR402	36534060	Transistor, 2SA1015-GR
TR403	36317480	Transistor, 2SC1815-BL
TR404	36317480	Transistor, 2SC1815-BL
TR405	36317480	Transistor, 2SC1815-BL
TR601	36534060	Transistor, 2SA1015-GR
TR602	36317460	Transistor, 2SC1815-GR
TR603	36317460	Transistor, 2SC1815-GR
TR604	36317460	Transistor, 2SC1815-GR
TR605	36317480	Transistor, 2SC1815-BL
TR606	36534060	Transistor, 2SA1015-GR
TR607	36534060	Transistor, 2SA1015-GR
TR608	36317460	Transistor, 2SC1815-GR
D001	22115251	Diode, W02
D002	22115574	Diode, RD13E-B3-M
D003	22115574	Diode, RD13E-B3-M
D201	37246703	Diode, 1S1555V
D202	37246703	Diode, 1S1555V
D203	37246703	Diode, 1S1555V
D204	37246703	Diode, 1S1555V
D205	37246703	Diode, 1S1555V
D206	37246703	Diode, 1S1555V
D207	37246703	Diode, 1S1555V
D208	37246703	Diode, 1S1555V
D209	37246703	Diode, 1S1555V
D210	22115469	Diode, GL-9PR2
D401	37246703	Diode, 1S1555V
D402	37246703	Diode, 1S1555V
D403	37246503	Diode, 1S1555V
D601	22115469	Diode, GL-9PR2
D602	22115469	Diode, GL-9PR2
D603	22115469	Diode, GL-9PR2
D604	22115469	Diode, GL-9PR2
D605	22115469	Diode, GL-9PR2

Symbol No.	Part No.	Description
D606	22115469	Diode, GL-9PR2
D607	22115469	Diode, GL-9PR2
D608	22115469	Diode, GL-9PR2
D609	22115469	Diode, GL-9PR2
D610	22115552	Diode, GL-9PG2
D611	37246703	Diode, 1S1555V
D612	37246703	Diode, 1S1555V
<b>COILS &amp; TRANSFORMERS</b>		
L101	22294396	RF Coil, FM
L102	22242775	Antenna Coil Assembly
L103	22245357	OSC Coil, MW
L104	22205060	OSC Coil, LW
L201	22211229	Choke Coil, AF
L202	22211229	Choke Coil, AF
L203	22241041	Choke Coil, FM
LCC201	22232228	MPX Filter
LCC202	22232228	MPX Filter
IFT201	22266335	IF Transformer, FM
IFT202	22266336	IF Transformer, FM
IFT203	22266337	IF Transformer, AM
IFT204	22266334	IF Transformer, AM
<b>CAPACITORS</b>		
Tolerance: D: $\pm 0.5$ PF, J: $\pm 5\%$ , K: $\pm 10\%$ , M: $\pm 20\%$ , P: $+100$ to $-0\%$ , Z: $+80$ to $-20\%$ ,		
C001	22303026	Oil-Filled 0.0047 mfd/450WV
C002	22303026	Oil-Filled 0.0047 mfd/450WV
C003	22342223	Ceramic 0.022 mfd, Z
C004	22342223	Ceramic 0.022 mfd, Z
C005	22342223	Ceramic 0.022 mfd, Z
C006	22342223	Ceramic 0.022 mfd, Z
C009	22446102	Electrolytic 1000 mfd/25WV
C010	22446102	Electrolytic 1000 mfd/25WV
C011	22445221	Electrolytic 220 mfd/16WV
C012	22445101	Electrolytic 100 mfd/16WV
C013	22445221	Electrolytic 220 mfd/16WV
C014	22403085	Electrolytic 0.47 mfd/50WV
C015	22342103	Ceramic 0.01 mfd, Z
C016	22342103	Ceramic 0.01 mfd, Z
C101	22361609	Ceramic 6 PF, D
C102	22371562	Mylar 0.0056 mfd, J
C103	Not used	
C104	22361130	Ceramic 13 PF, J
C105	22361100	Ceramic 10 PF, D
C106	22343222	Ceramic 0.0022 mfd, M

Symbol No.	Part No.	Description
C107	22343222	Ceramic 0.0022 mfd, M
C108	22343102	Ceramic 0.001 mfd, M
C201	22342223	Ceramic 0.022 mfd, Z
C202	22342223	Ceramic 0.022 mfd, Z
C203	22342103	Ceramic 0.01 mfd, Z
C204	22343102	Ceramic 0.001 mfd, M
C205	22342223	Ceramic 0.022 mfd, Z
C206	22342223	Ceramic 0.022 mfd, Z
C207	22343102	Ceramic 0.001 mfd, M
C208	22343102	Ceramic 0.001 mfd, M
C209	22361390	Ceramic 39 PF, J
C210	22342473	Ceramic 0.047 mfd, Z
C211	22342473	Ceramic 0.047 mfd, Z
C212	22342473	Ceramic 0.047 mfd, Z
C213	22361331	Ceramic 330 PF, J
C214	22445100	Electrolytic 10 mfd/16WV
C215	22440305	Electrolytic 0.47 mfd/50WV
C216	22342223	Ceramic 0.022 mfd, Z
C217	22342223	Ceramic 0.022 mfd, Z
C218	22342223	Ceramic 0.022 mfd, Z
C219	22342223	Ceramic 0.022 mfd, Z
C220	22342223	Ceramic 0.022 mfd, Z
C221	22342223	Ceramic 0.022 mfd, Z
C222	22448109	Electrolytic 1 mfd/50WV
C223	22445100	Electrolytic 10 mfd/16WV
C224	22342223	Ceramic 0.022 mfd, Z
C225	22445221	Electrolytic 220 mfd/16WV
C226	22371473	Mylar 0.047 mfd, J
C227	22371122	Mylar 0.0012 mfd, J
C228	22371122	Mylar 0.0012 mfd, J
C229	22440325	Electrolytic 10 mfd/16WV
C230	22440325	Electrolytic 10 mfd/16WV
C231	22445100	Electrolytic 10 mfd/16WV
C232	22445100	Electrolytic 10 mfd/16WV
C233	22402051	Aluminum 0.22 mfd, K
C234	22402054	Aluminum 1 mfd/16WV
C235	22402056	Aluminum 3.3 mfd/16WV
C236	22391471	Polypropylene 470 PF, J
C237	22371102	Mylar 0.001 mfd, J
C238	22371102	Mylar 0.001 mfd, J
C239	22371393	Mylar 0.039 mfd, J
C240	22440343	Electrolytic 0.22 mfd/50WV
C241	22342223	Ceramic 0.022 mfd, Z
C261	22342103	Ceramic 0.01 mfd, Z
C262	22360487	Ceramic 51 PF, J
C263	22360480	Ceramic 10 PF, D
C264	22371223	Mylar 0.022 Mfd, J
C265	22360482	Ceramic 120 PF, J
C266	22360483	Ceramic 300 PF, J
C267	22342223	Ceramic 0.022 mfd, Z
C268	22342103	Ceramic 0.01 mfd, Z
C269	22342103	Ceramic 0.01 mfd, Z
C270	22440305	Electrolytic 0.47 mfd/50WV
C271	22371223	Mylar 0.022 mfd, J

Symbol No.	Part No.	Description
C272	22342223	Ceramic 0.022 mfd, Z
C273	22343103	Ceramic 0.01 mfd, Z
C274	22448109	Electrolytic 1 mfd/50WV
C275	22446479	Electrolytic 4.7 mfd/25WV
C276	22342223	Ceramic 0.022 mfd, Z
C277	22342223	Ceramic 0.022 mfd, Z
C278	22342103	Ceramic 0.01 mfd, Z
C279	22371333	Mylar 0.033 mfd, J
C280	22440343	Electrolytic 0.22 mfd/50WV
C281	22371223	Mylar 0.022 mfd, J
C282	22371223	Mylar 0.022 mfd, J
C283	22371223	Mylar 0.022 mfd, J
C284	22371333	Mylar 0.033 mfd, J
C285	22371473	Mylar 0.047 mfd, J
C286	22445100	Electrolytic 10 mfd/16WV
C287	22446479	Electrolytic 4.7 mfd/25WV
C288	Not used	
C289	22445470	Electrolytic 47 mfd/16WV
C290	Not used	
C291	22342223	Ceramic 0.022 mfd, Z
C292	22343472	Ceramic 0.0047 mfd, M
C293	22343472	Ceramic 0.0047 mfd, M
C294	22361101	Ceramic 100 PF, K
C403	22440325	Electrolytic 10 mfd/16WV
C404	22440325	Electrolytic 10 mfd/16WV
C405	22440325	Electrolytic 10 mfd/16WV
C406	22440325	Electrolytic 10 mfd/16WV
C407	22445101	Electrolytic 100 mfd/16WV
C408	22446479	Electrolytic 4.7 mfd/25WV
C409	22440306	Electrolytic 2.2 mfd/50WV
C601	22342223	Ceramic 0.022 mfd, Z
C602	22342223	Ceramic 0.022 mfd, Z
C603	22448109	Electrolytic 1 mfd/50WV
C604	Not used	
C605	22446479	Electrolytic 4.7 mfd/25WV
C606	22361470	Ceramic 47 PF, J
C607	22448109	Electrolytic 1 mfd/50WV
C608	22448109	Electrolytic 1 mfd/50WV
C609	22448109	Electrolytic 1 mfd/50WV
C610	22448109	Electrolytic 1 mfd/50WV
C611	22448109	Electrolytic 1 mfd/50WV
C612	22342223	Ceramic 0.022 mfd, Z
TC101	22309104	Trimmer
TC102	22309104	Trimmer
TC103	22309104	Trimmer
TC104	22309104	Trimmer

Symbol No.	Part No.	Description
<b>RESISTORS</b>		
All fixed resistors are 1/8W, $\pm 5\%$ , carbon resistor unless otherwise noted. Tolerance: J: $\pm 5\%$ , K: $\pm 10\%$		
R001	22573569	Metal oxide 5.6 ohm, 2W
R002	22573569	Metal Oxide 5.6 ohm, 2W
R003	22571471	Metal Oxide 470 ohm, 1W
R004	22571681	Metal Oxide 680 ohm, 1W
R005	22571221	Metal Oxide 220 ohm, 1W
R101	22543102	1K ohm
R201	22543220	22 ohm
R202	22543153	15K ohm
R203	22543103	10K ohm
R204	22543331	330 ohm
R205	22543102	1K ohm
R206	22543332	3.3K ohm
R207	22543121	120 ohm
R208	22543391	390 ohm
R209	22543103	10K ohm
R210	22543103	10K ohm
R211	22543103	10K ohm
R212	22543103	10K ohm
R213	22543103	10K ohm
R214	22543221	220 ohm
R215	22543331	330 ohm
R216	22543563	56K ohm
R217	22543822	8.2K ohm
R218	22543122	1.2K ohm
R219	22543123	12K ohm
R220	22543392	3.9K ohm
R221	22543152	1.5K ohm
R222	22543222	2.2K ohm
R223	22543563	56K ohm
R224	22543333	33K ohm
R225	22543223	22K ohm
R226	22543103	10K ohm
R227	22543153	15K ohm
R228	22543333	33K ohm
R229	Not used	
R230	22500200	Fusible 56 ohm, $\frac{1}{4}W$ , J
R231	22543333	33K ohm
R232	22543333	33K ohm
R233	22543272	2.7K ohm
R234	22543272	2.7K ohm
R235	22543473	47K ohm
R236	22543473	47K ohm
R237	22543332	3.3K ohm
R238	22543332	3.3K ohm
R239	22543152	1.5K ohm, $\frac{1}{4}W$ (J)
R240	22543224	220K ohm
R241	22543102	1K ohm
R242	22543183	18K ohm
R243	22543153	15K ohm
R244	22543224	220K ohm
R245	22543562	5.6K ohm

Symbol No.	Part No.	Description
R246	22543392	3.9K ohm
R247	22543332	3.3K ohm
R248	22543332	3.3K ohm
R249	22543223	22K ohm
R250	22543472	4.7K ohm
R251	22543271	270K ohm
R252	22543332	3.3K ohm
R253	22543333	33K ohm
R254	22543333	33K ohm
R255	22543153	15K ohm
R256	22543153	15K ohm
R257	22543332	3.3K ohm
R258	22543104	100K ohm
R259	22543124	120K ohm
R260	22543105	1M ohm
R261	22543560	56 ohm
R262	Not used	
R263	22543152	1.5K ohm
R264	22543224	220K ohm
R265	22543562	5.6K ohm
R266	22543104	100K ohm
R267	22543561	680 ohm
R268	22543123	12K ohm
R269	22543392	3.9K ohm
R270	22543103	10K ohm
R271	22543222	2.2K ohm
R272	22543123	12K ohm
R273	22543563	56K ohm
R274	22543333	33K ohm
R275	22543102	1K ohm
R276	22543823	82K ohm
R277	22543394	390K ohm
R278	22543472	4.7K ohm
R279	22543472	4.7K ohm
R280	22543472	4.7K ohm
R281	22543154	150K ohm
R282	22543182	1.8K ohm
R283	22543123	12K ohm
R284	22543222	2.2K ohm
R285	22543222	2.2K ohm
R286	22543222	2.2K ohm
R287	22543222	2.2K ohm
R288	22543332	3.3K ohm
R289	Not used	
R290	22543121	120 ohm
R291	22500246	Fusible 46 ohm, $\frac{1}{4}W$ , J
R292	22543101	100 ohm
R293	Not used	
R294	22543331	330 ohm
R295	22543102	1K ohm
R296	22543471	470 ohm
R297	22543681	680 ohm
R401	22543473	47K ohm
R402	22543473	47K ohm



Symbol No.	Part No.	Description
R403	22543392	3.9K ohm
R404	22543392	3.9K ohm
R405	22543335	3.3M ohm
R406	22543335	3.3M ohm
R407	22543683	68K ohm
R408	22543683	68K ohm
R409	22543473	47K ohm
R410	22543473	47K ohm
R411	22543335	3.3M ohm
R412	22543335	3.3M ohm
R413	22543331	330 ohm
R414	22543221	220 ohm
R415	22543822	8.2K ohm
R416	22543471	470 ohm
R417	22543333	33K ohm
R418	22543124	120K ohm
R419	22543473	47K ohm
R420	22543101	100 ohm
R421	22543683	68K ohm
R422	22543153	15K ohm
R423	Not used	
R424	22543103	10K ohm
R425	22543273	27K ohm
R601	22543684	680K ohm
R602	22543102	1K ohm
R603	22543102	1K ohm
R604	22543472	4.7K ohm
R605	22543223	22K ohm
R606	22543223	22K ohm
R607	22543102	1K ohm
R608	22543102	1K ohm
R609	22543102	1K ohm
R610	22543102	1K ohm
R611	22543103	10K ohm
R612	22543103	10K ohm
R613	22543223	22K ohm
R614	22543223	22K ohm
R615	22543103	10K ohm
R616	22543103	10K ohm
R617	22543103	10K ohm
R618	22543103	10K ohm
R619	22543103	10K ohm
R620	22543103	10K ohm
R621	22543272	2.7K ohm
R622	22543471	470 ohm, ¼W J
R631	22543153	15K ohm
R632	22543822	8.2K ohm
R633	22543822	8.2K ohm
R634	22543152	1.5K ohm
R635	22543123	12K ohm
R636	22543104	100K ohm
R637	22543183	18K ohm
R638	22543101	100 ohm
R639	22543101	100 ohm

Symbol No.	Part No.	Description
R640	22543101	100 ohm
R641	22543101	100 ohm
R642	22543101	100 ohm
R643	22553183	18K ohm
SVR201	22658470	Semi-Fixed 200K ohm
SVR202	22658514	Semi-Fixed 10K ohm
SVR203	22658455	Semi-Fixed 20K ohm
SVR601	22658444	Semi-Fixed 4.7K ohm
<b>MISCELLANEOUS</b>		
CF201	22153068	Ceramic Filter
CF202	22153068	Ceramic Filter
CF203	22153068	Ceramic Filter
F001	22144192	Fuse, 0.5A.T
F002	22144192	Fuse, 0.5A.T
	22165047	Fuse Holding Terminal
S1	22140556	Push Switch (Power)
S2~S7	22140610	Push Switch (FUNCTION, MUTING/MODE, IF BAND, REC. CAL.)
TH601	22691081	Thermister (TH-112132-45311)
PT1	22223518	Power Transformer
	22176529	Power Cord
	22131222	Block-FM
PL001	22113473	Pilot Lamp 0.2A/12V

## EXPLODED VIEW PARTS

Symbol No.	Part No.	Description
1	20848607	Top Cover
2	20713845	Front Panel
3	20848601	Dial Cover
4	20779928	Name Plate
5	20743973	Button Guide
6	20874668	Push Button
7	20874667	Push Button
8	22772611	Spring
9	22837836	Dial Back
10	22837835	Dial Plate
11	20746989	Light Support
12	20746990	Dial Support
13	22756840	Cushion
14	22756528	Cushion
15	22832822	Bottom Cover
16	20842649	Foot
17	20015804	Back Chassis
18	22754791	Cord Calmper
19	22184183	Cord Clamper
20	22167634	DIN2P Socket Assembly
21	22242775	Antenna Coil Assembly (L102)
22	20746992	Pulley Support
23	20042715	Drum
24	22771618	Pull Spring
25	22745502	Dial String
26	54301010	Sprit Pin
27	20791809	Special Washer
28	20746991	LED Support
29	20041664	Pointer Assembly
30	20872620	Tuning Knob
31	20743976	LED Guide
32	20773899	LED Spacer
33	22848794	Radiator
34	22193153	Lamp P.C. Board
35	22756533	Cushion
36	22756976	Cushion
37	Not Used	
38	Not Used	
39	Not Used	
40	Not Used	
41	Not Used	
42	20015796	Chassis
43	20042700	Tuning Shaft
44	22193152	Radio P.C. Board
45	20735693	Bracket
46	20735698	Power Transformer Bracket
47	22748853	Barrier
48	20746994	P.C. Board Support
49	20746995	P.C. Board Support
50	22163765	Jack, US2P
51	22223518	Power Transformer PT1
52	22176529	Power Cord

Symbol No.	Part No.	Description
<b>SCREWS &amp; RINGS</b>		
N1	70433006	Bind Head 3.0 x 6mm
N2	Not Used	
N3	22701716	Bind Head 3.0 x 14mm
N4	Not Used	
N5	72633008	Bind Head Tapping 3.0 x 8mm
N6	22701724	Bind Head Tapping 3.0 x 10mm
N7	74022030	Lock Washer 3.0 $\phi$
N8	70443006	Flat Head Screw 3.0 x 6mm
N9	73653000	Nut 3.0
N10	75820352	Eyelet 2.0 $\phi$ x 2mm
N11	22701586	Pan Head 3.0 x 8mm with W/SW
N12	22701711	Pan Head 4.0 x 8mm with W/SW
N13	20795986	Bind Head 3.0x8mm with SW
N14	20795955	Bind Head 3.0x6mm with SW
<b>ACCESSORIES</b>		
	22124266	FM Antenna
	22953918	Owner's Manual
	22951862	Warranty Card

MEMO

# MODEL TP2200

## 1. SPECIFICATIONS

Rated Output Impedance . . . . .	0.775V/4.7 k ohms
Input Sensitivity and Impedance	
Phono . . . . .	2.5mV/47 k ohms
AUX. . . . .	150mV/80 k ohms
Tuner . . . . .	150mV/80 k ohms
TAPE-1, TAPE-2. . . . .	150mV/80 k ohms
Microphone . . . . .	1.0mV/10 k ohms
Recording Output	
RCA Pin Terminal (TAPE-1) . . . . .	150mV
DIN Terminal (TAPE-1, TAPE-2) . . . . .	0.5mV/k ohms
Maximum Input at PHONO. . . . .	150mV
Frequency Response	
PHONO refer to RIAA . . . . .	$\pm 0.2$ dB
Tuner, AUX, TAPE-1, TAPE-2	
20 – 20,000 Hz ref. 1 kHz . . . . .	$\pm 1$ dB
Tone Control	
Bass at 50 Hz . . . . .	$\pm 8$ dB
Middle at 1,000 Hz . . . . .	$\pm 8$ dB
Treble at 20,000 Hz. . . . .	$\pm 8$ dB

Subsonic Filter (turn over: 20 Hz) . . . . .	–6 dB/Oct
High Cut Filter (turn over: 7 kHz) . . . . .	–6 dB/Oct
Loudness Control at 100 Hz	
(–30 dB attenuated) . . . . .	+8 dB
Total Harmonic Distortion	
at 20 – 20,000 Hz, 1 Volt Output	
PHONO. . . . .	0.02%
Tuner . . . . .	0.01%
AUX, TAPE-1, TAPE-2 . . . . .	0.01%
Signal to Noise Ratio (IHF-A)	
PHONO. . . . .	75 dB
AUX, Tuner, TAPE-1, TAPE-2. . . . .	90 dB
Power Supply . . . . .	220 to 240 Volts 50 Hz $\sim$
Dimensions . . . . .	430(W) x 80(H) x 250(D) mm
Weight. . . . .	4.5 kg

## 2. DISASSEMBLY INSTRUCTIONS

### (1) Top cover removal

Remove four screws on the both sides of the set and lift up the top cover.

### (2) Bottom cover removal

Remove a screw on the center of the bottom cover and lift it up.

### (3) Front panel removal

Remove seven rotary knobs.

Remove six screws (A) from top and bottom as shown in Figure 10 and 11, and the panel can be removed with push buttons.

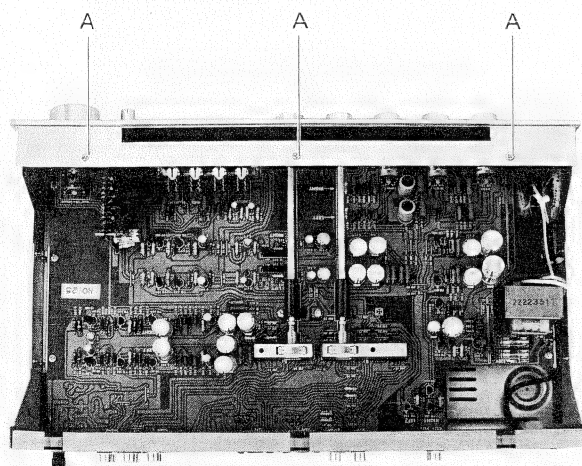


Figure 10

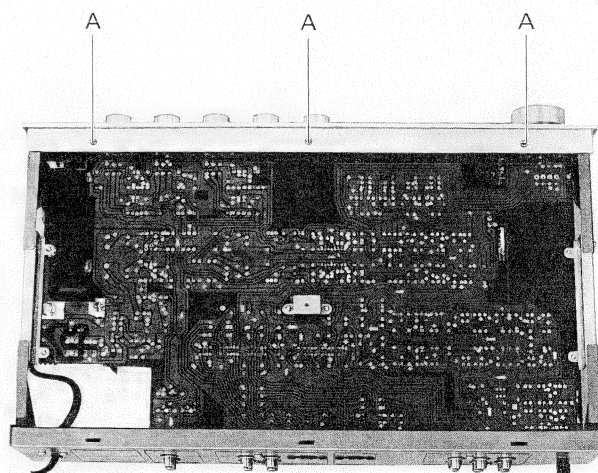
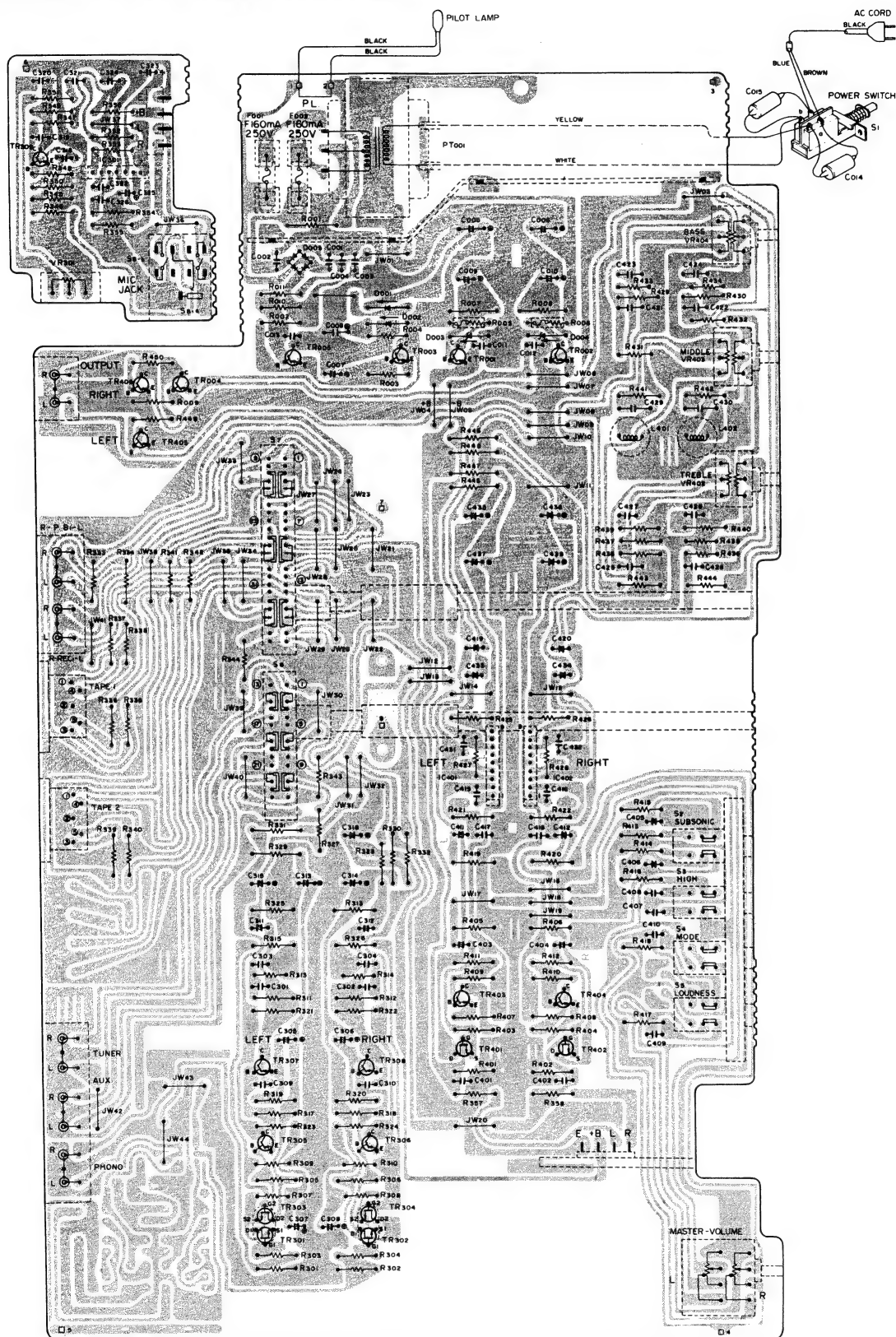


Figure 11

### NOTE:

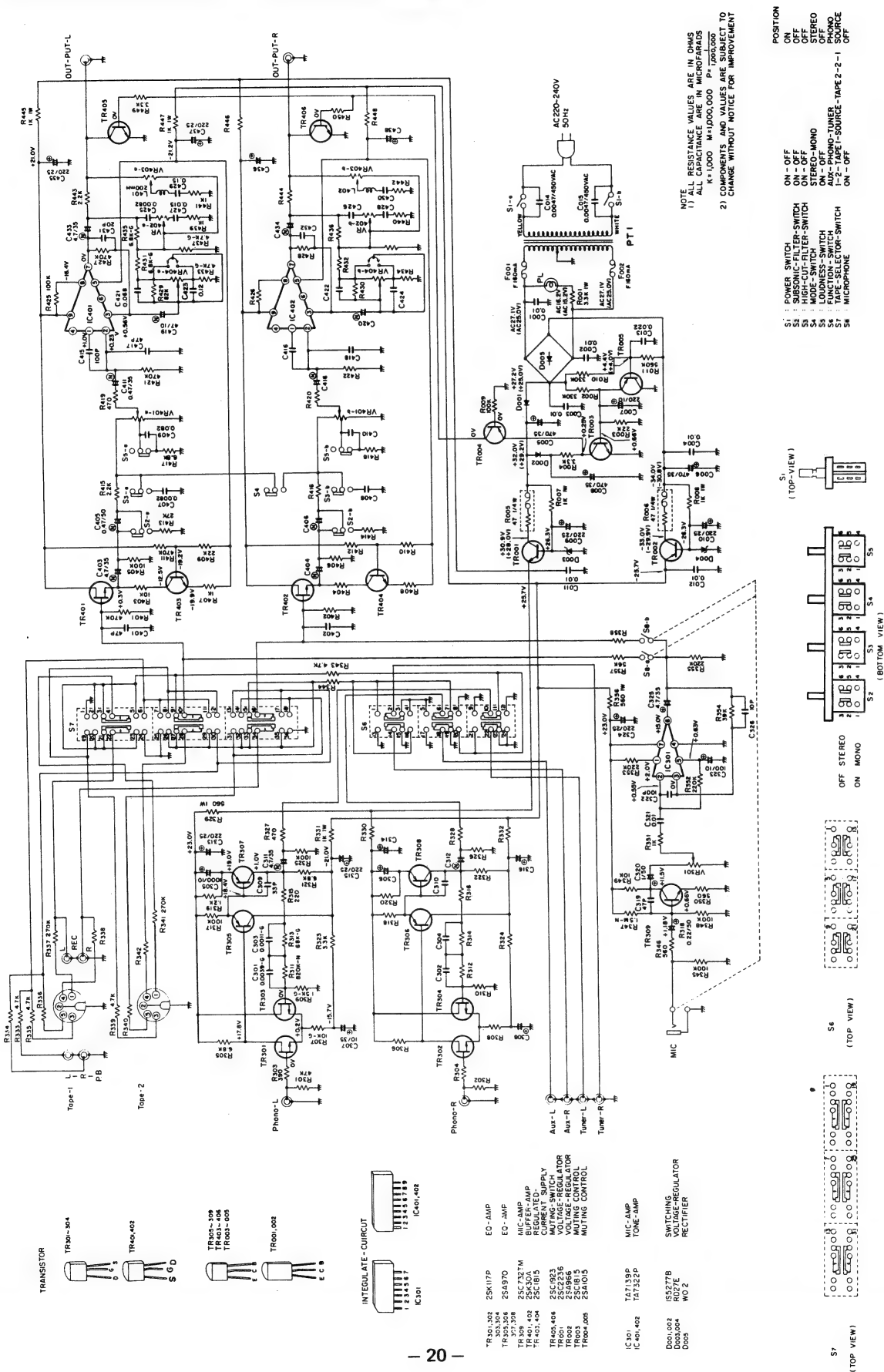
This model has no alignment point.

### 3. PRINTED CIRCUIT BOARDS BOTTOM VIEW AND WIRING





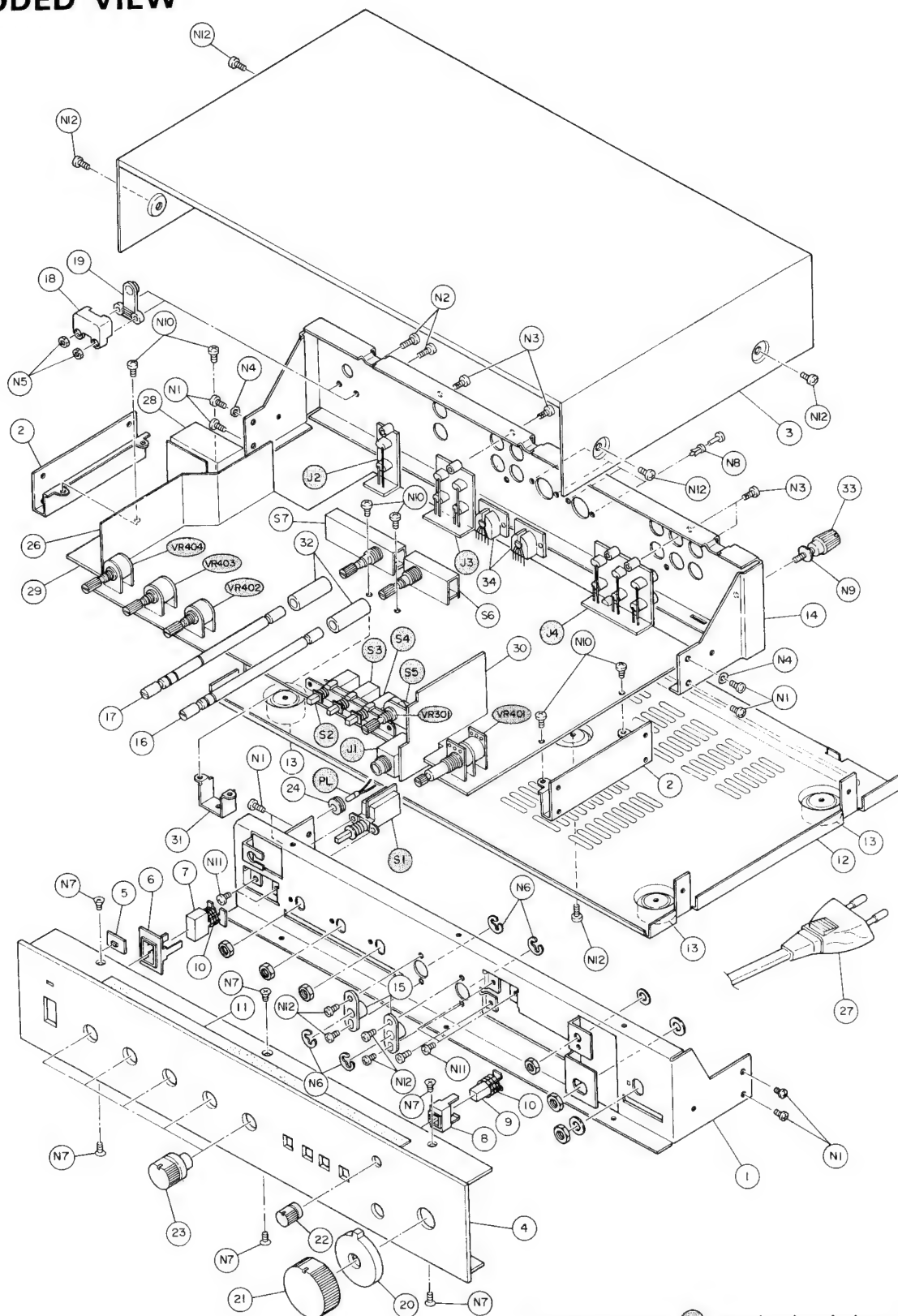
1-800-4-A-RENTAL




## 5. EXPLODED VIEW AND PARTS LISTS

### EXPLODED VIEW

TP2200



The parts marked , see the electrical parts list.

## PARTS LIST

### ELECTRICAL PARTS

Symbol No.	Part No.	Description
<b>ICs</b>		
IC301	40312700	IC, TA7139P
IC401	40325020	IC, TA7322P
IC402	40325020	IC, TA7322P
<b>TRANSISTORS &amp; DIODES</b>		
TR001	36325540	Transistor, 2SC2236-Y
TR002	36533240	Transistor, 2SA966-Y
TR003	36317480	Transistor, 2SC1815-BL
TR004	36534060	Transistor, 2SA1015-GR
TR005	36534060	Transistor, 2SA1015-GR
TR301	36041845	Transistor, 2SK117-Y (P)
TR302	36041845	Transistor, 2SK117-Y (P)
TR303	36041845	Transistor, 2SK117-Y (P)
TR304	36041845	Transistor, 2SK117-Y (P)
TR305	36533640	Transistor, 2SA970-BL
TR306	36533640	Transistor, 2SA970-BL
TR307	36533640	Transistor, 2SA970-BL
TR308	36533640	Transistor, 2SA970-BL
TR309	36733140	Transistor, 2SC732TM-BL
TR401	36048350	Transistor, 2SK30ATM-Y
TR402	36048350	Transistor, 2SK30ATM-Y
TR403	36317480	Transistor, 2SC1815-BL
TR404	36317480	Transistor, 2SC1815-BL
TR405	36319020	Transistor, 2SC1923-0
TR406	36319020	Transistor, 2SC1923-0
D001	37978380	Diode, 1S5277B
D002	37978380	Diode, 1S5277B
D003	22115573	Diode, RD27E-B2-X
D004	22115573	Diode, RD27E-B2-X
D005	22115251	Diode, W02
<b>CAPACITORS</b>		
Tolerance: D: $\pm 0.5$ PF, J: $\pm 5\%$ , K: $\pm 10\%$ , M: $\pm 20\%$ , P: +100 to -0%, Z: +80 to -20%, G: $\pm 2\%$ (N): Nonpolarity type		
C001	22342223	Ceramic 0.022 mfd, Z
C002	22342223	Ceramic 0.022 mfd, Z
C003	22342223	Ceramic 0.022 mfd, Z
C004	22342223	Ceramic 0.022 mfd, Z
C005	22447471	Electrolytic 470 mfd/35WV
C006	22447471	Electrolytic 470 mfd/35WV
C007	22443221	Electrolytic 220 mfd/10WV
C008	22447471	Electrolytic 470 mfd/35WV
C009	22446221	Electrolytic 220 mfd/25WV
C010	22446221	Electrolytic 220 mfd/25WV
C011	22342223	Ceramic 0.022 mfd, Z
C012	22342223	Ceramic 0.022 mfd, Z

Symbol No.	Part No.	Description
C013	22372223	Mylar 0.022 mfd, K
C014	22303026	Oil-Filled 0.0047 mfd/450WV
C015	22303026	Oil-Filled 0.0047 mfd/450WV
C301	22370256	Mylar 0.0039 mfd, G
C302	22370256	Mylar 0.0039 mfd, G
C303	22370196	Mylar 0.0011 mfd, G
C304	22370196	Mylar 0.0011 mfd, G
C305	22443102	Electrolytic 1000 mfd/10WV
C306	22443102	Electrolytic 1000 mfd/10WV
C307	22447100	Electrolytic 10 mfd/35WV
C308	22447100	Electrolytic 10 mfd/35WV
C309	22361330	Ceramic 33 PF, J
C310	22361330	Ceramic 33 PF, J
C311	22403080	Electrolytic 4.7 mfd/35WV(N)
C312	22403080	Electrolytic 4.7 mfd/35WV(N)
C313	22446221	Electrolytic 220 mfd/25WV
C314	22446221	Electrolytic 220 mfd/25WV
C315	22446221	Electrolytic 220 mfd/25WV
C316	22446221	Electrolytic 220 mfd/25WV
C318	22440313	Electrolytic 0.22 mfd/50WV
C319	22361470	Ceramic 47 PF, K
C320	22440314	Electrolytic 1 mfd/50WV
C321	22371103	Mylar 0.01 mfd, J
C322	22361101	Ceramic 100 PF, K
C323	22443101	Electrolytic 100 mfd/10WV
C324	22446221	Electrolytic 220 mfd/25WV
C325	22440316	Electrolytic 4.7 mfd/50WV
C326	22361100	Ceramic 10 PF, D
C401	22361470	Ceramic 47 PF, K
C402	22361470	Ceramic 47 PF, K
C403	22403080	Electrolytic 4.7 mfd/35WV(N)
C404	22403080	Electrolytic 4.7 mfd/35WV(N)
C405	22403075	Electrolytic 0.47 mfd/50WV(N)
C406	22403075	Electrolytic 0.47 mfd/50WV(N)
C407	22371822	Mylar 0.0082 mfd, J
C408	22371822	Mylar 0.0082 mfd, J
C409	22371823	Mylar 0.082 mfd, J
C410	22371823	Mylar 0.082 mfd, J
C411	22403075	Electrolytic 0.47 mfd/50WV
C412	22403075	Electrolytic 0.47 mfd/50WV
C415	22361101	Ceramic 100 PF, K
C416	22361101	Ceramic 100 PF, K
C417	22361470	Ceramic 47 PF, K
C418	22361470	Ceramic 47 PF, K
C419	22403081	Electrolytic 47 mfd/10WV(N)
C420	22403081	Electrolytic 47 mfd/10WV(N)
C421	22371683	Mylar 0.068 mfd, J
C422	22371683	Mylar 0.068 mfd, J
C423	22370255	Mylar 0.12 mfd, J
C424	22370255	Mylar 0.12 mfd, J
C425	22371822	Mylar 0.0082 mfd, J
C426	22371822	Mylar 0.0082 mfd, J

Symbol No.	Part No.	Description
C427	22371153	Mylar 0.015 mfd, J
C428	22371153	Mylar 0.015 mfd, J
C429	22371154	Mylar 0.15 mfd, J
C430	22371154	Mylar 0.15 mfd, J
C431	22361200	Ceramic 20 PF, J
C432	22361200	Ceramic 20 PF, J
C433	22403080	Electrolytic 4.7 mfd/35WV(N)
C434	22403080	Electrolytic 4.7 mfd/35WV(N)
C435	22446221	Electrolytic 220 mfd/25WV
C436	22446221	Electrolytic 220 mfd/25WV
C437	22446221	Electrolytic 220 mfd/25WV
C438	22446221	Electrolytic 220 mfd/25WV

### RESISTORS

All fixed resistors are  $\frac{1}{4}W$ ,  $\pm 5\%$ , carbon resistor unless otherwise noted.

Tolerance: G:  $\pm 2\%$ , J:  $\pm 5\%$ , K:  $\pm 10\%$

R001	22571332	Metal Oxide 3.3K ohm, 1W
R002	22545334	330K ohm
R003	22545223	22K ohm
R004	22545332	3.3K ohm
R005	22500246	Fusible 47 ohm $\frac{1}{4}W$ , J
R006	22500246	Fusible 47 ohm $\frac{1}{4}W$ , J
R007	22571152	Metal Oxide 1.5K ohm, 1W
R008	22571152	Metal Oxide 1.5K ohm, 1W
R009	22545104	100K ohm
R010	22545334	330K ohm
R011	22545564	560K ohm
R301	22545473	47K ohm
R302	22545473	47K ohm
R303	22545391	390 ohm
R304	22545391	390 ohm
R305	22545682	6.8K ohm
R306	22545682	6.8K ohm
R307	22570537	Metal Oxide 10K ohm, $\frac{1}{4}W$ , G
R308	22570537	Metal Oxide 10K ohm, $\frac{1}{4}W$ , G
R309	22570528	Metal Oxide 1.5K ohm, $\frac{1}{4}W$ , G
R310	22570528	Metal Oxide 1.5K ohm, $\frac{1}{4}W$ , G
R311	22510017	820K ohm, $\frac{1}{4}W$ , Low Noise
R312	22510017	820K ohm, $\frac{1}{4}W$ , Low Noise
R313	22570541	Metal Oxide 68K ohm, $\frac{1}{4}W$ , G
R314	22570541	Metal Oxide 68K ohm, $\frac{1}{4}W$ , G
R315	22545221	220 ohm
R316	22545221	220 ohm
R317	22545104	100K ohm
R318	22545104	100K ohm
R319	22545122	1.2K ohm
R320	22545122	1.2K ohm
R321	22545682	6.8K ohm
R322	22545632	6.8K ohm
R323	22545332	3.3K ohm

Symbol No.	Part No.	Description
R324	22545332	3.3K ohm
R325	22545104	100K ohm
R326	22545104	100K ohm
R327	22545471	470 ohm
R328	22545471	470 ohm
R329	22571561	Metal Oxide 560 ohm, 1W
R330	22571561	Metal Oxide 560 ohm, 1W
R331	22571102	Metal Oxide 1K ohm, 1W
R332	22571102	Metal Oxide 1K ohm, 1W
R333	22545472	4.7K ohm
R334	22545472	4.7K ohm
R335	22545472	4.7K ohm
R336	22545472	4.7K ohm
R337	22545274	270K ohm
R338	22545274	270K ohm
R339	22545472	4.7K ohm
R340	22545472	4.7K ohm
R341	22545274	270K ohm
R342	22545274	270K ohm
R343	22545472	4.7K ohm
R344	22545472	4.7K ohm
R345	22545104	100K ohm
R346	22545561	560 ohm
R347	22510018	1.5M ohm, $\frac{1}{4}W$ , Low Noise
R348	22545104	100K ohm
R349	22545103	10K ohm
R350	22545561	560 ohm
R351	22545102	1K ohm
R352	22545224	220K ohm
R353	22545224	220K ohm
R354	22545393	39K ohm
R355	22545224	220K ohm
R356	22571561	Metal Oxide 560 ohm, 1W
R357	22545563	56K ohm
R358	22545563	56K ohm
R401	22545474	470K ohm
R402	22545474	470K ohm
R403	22545103	10K ohm
R404	22545103	10K ohm
R405	22545104	100K ohm
R406	22545104	100K ohm
R407	22545102	1K ohm
R408	22545102	1K ohm
R409	22545223	22K ohm
R410	22545223	22K ohm
R411	22545474	470K ohm
R412	22545474	470K ohm
R413	22545273	27K ohm
R414	22545273	27K ohm
R415	22545222	2.2K ohm
R416	22545222	2.2K ohm
R417	22545682	6.8K ohm
R418	22545682	6.8K ohm
R419	22545471	470 ohm

Symbol No.	Part No.	Description
R420	22545471	470 ohm
R421	22545474	470K ohm
R422	22545474	470K ohm
R425	22545104	100K ohm
R426	22545104	100K ohm
R427	22545474	470K ohm
R428	22545474	470K ohm
R429	22545823	82K ohm
R430	22545823	82K ohm
R431	22570536	Metal Oxide 6.8K ohm, ¼W, G
R432	22570536	Metal Oxide 6.8K ohm, ¼W, G
R433	22570535	Metal Oxide 4.7K ohm, ¼W, G
R434	22570535	Metal Oxide 4.7K ohm, ¼W, G
R435	22570536	Metal Oxide 6.8K ohm, ¼W, G
R436	22570536	Metal Oxide 6.8K ohm, ¼W, G
R437	22570535	Metal Oxide 4.7K ohm, ¼W, G
R438	22570535	Metal Oxide 4.7K ohm, ¼W, G
R439	22545102	1K ohm
R440	22545102	1K ohm
R441	22545102	1K ohm
R442	22545102	1K ohm
R443	22545222	2.2K ohm
R444	22545222	2.2K ohm
R445	22571102	Metal Oxide 1K ohm, 1W
R446	22571102	Metal Oxide 1K ohm, 1W
R447	22571102	Metal Oxide 1K ohm, 1W
R448	22571102	Metal Oxide 1K ohm, 1W
R449	22545332	3.3K ohm
R450	22545332	3.3K ohm
VR301	22624212	Variable, 20K ohm
VR401	22620222	Variable, 100K ohm
VR402	22626203	Variable, 50K ohm
VR403	22626203	Variable, 50K ohm
VR404	22626202	Variable, 50K ohm

#### MISCELLANEOUS

L401	22211253	Choke Coil, AF
L402	22211253	Choke Coil, AF
S1	22140518	Push Switch (Power)
S2~S5	22140607	Push Switch
S6	22140609	Rotary Switch
S7	22140608	Rotary Switch
PL	22113469	Pilot Lamp 0.015A/12V
J1	22163764	Jack 6.5φ
J2	22163761	US2P Jack
J3	22163762	US4P Jack
J4	22163763	US6P Jack
PT1	22223517	Power Transformer
PT2	22176529	Power Cord
F001, 002	22144206	Fuse 0.16A-S
	22165047	Fuse Holding Terminal

#### EXPLODED VIEW PARTS

Symbol No.	Part No.	Description
1	20015798	Chassis
2	20735694	Bracket
3	20848608	Top Cover
4	20713844	Front Panel
5	20857611	LED Lens
6	20743973	Button Guide
7	20874668	Push Button
8	20743974	Button Guide
9	20874667	Push Button
10	22772611	Spring
11	22756528	Cushion
12	22832822	Bottom Cover
13	20842649	Foot
14	20015805	Back Chassis
15	20743975	Guide
16	20764778	Shaft
17	20764785	Shaft
18	22754791	Cord Clamper
19	22184183	Cord Clamper
20	20872622	Volume Knob R
21	20872617	Volume Knob L
22	20872618	Mixing Knob
23	20872619	Tone Knob
24	22756561	Rubber Cushion
26	22748838	Shield Plate
27	22176529	Power Cord
28	22223517	Power Transformer
29	22193150	AF P.C. Board
30	22193151	MIC P.C. Board
31	20746995	P.C. Board Support
32	20754792	Joint
33	22162380	S1P Terminal
34	22167877	DIN 5P Socket

#### SCREWS & RINGS

N1	70433006	Bind Head 3.0 x 6mm
N2	22701716	Bind Head 3.0 x 14mm
N3	22701724	Bind Head Tapping 3.0 x 10mm
N4	74022030	Lock Washer 3.0φ
N5	73653000	Nut 3.0
N6	74050050	Retaining Ring 5.0φ
N7	70443006	Flat Head 3.0 x 6mm
N8	22705506	Special Rivet
N9	22703553	Washer 3.2φ
N10	22701586	PAN Head 3.0x8mm W/SW
N11	20795955	Bind Head 3.1x6mm with SW



Symbol No.	Part No.	Description
ACCESSORIES		
	22164839	US1P Short-plug
	22164836	US1P Plug Cord
	22953919	Owner's Manual
	22951862	Warranty Card

# MODEL TM2250

## 1. SPECIFICATIONS

Power Output . . . . . 50 Watts per channel at 4 ohms  
from 20 to 20,000 Hz, both  
channels driven 0.08% T.H.D.

Damping Factor at 1 kHz 4 ohms . . . . . 30

Frequency Response (−1.5 dB) . . . . . 5 to 60 kHz

Signal to Noise Ratio (IHF-A) . . . . . 110 dB

Power Supply . . . . . AC 220/240 Volts 50 Hz ~

Dimensions . . . . . 430(W) x 80(H) x 250(D) mm

Weight . . . . . 7.5 kg

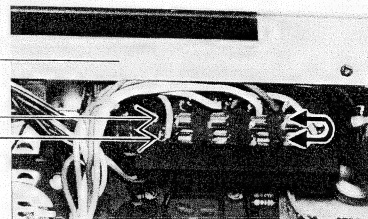
### NOTE:

According to the power supply voltage, select the position of fuses.

Front panel

For 220 V

For 240 V



## 2. DISASSEMBLY INSTRUCTIONS

### (1) Top cover removal

Remove four screws on the both sides of the set and lift up the top cover.

### (2) Bottom cover removal

Remove a screw on the center of the bottom cover and lift the bottom cover.

### (3) Front panel removal

Remove a speaker selector knob.

Remove six screws (A) from top and bottom as shown in Figure 12 and 13, and the front panel with push buttons can be removed.

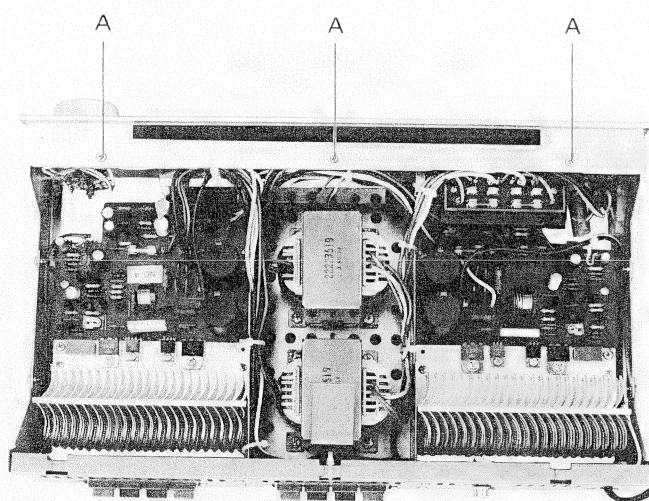


Figure 12

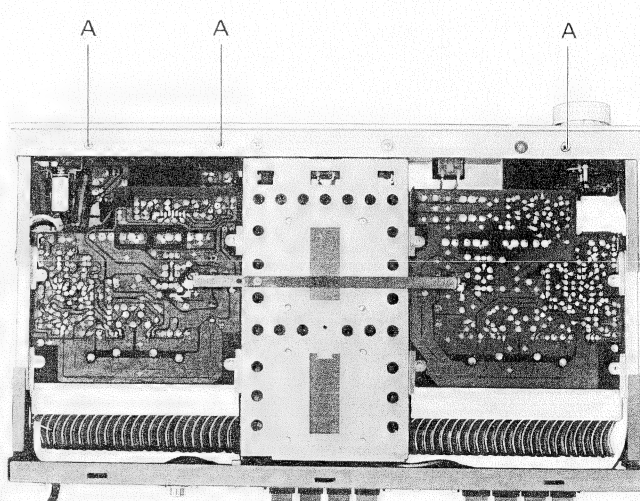


Figure 13

## 3. ALIGNMENT INSTRUCTIONS

### IDLE CURRENT

#### TEST EQUIPMENTS

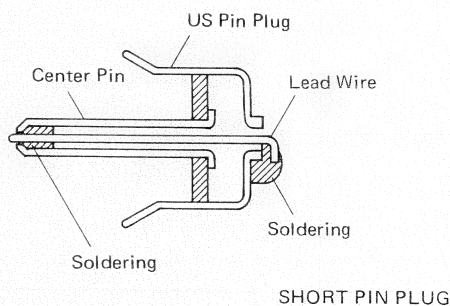
- (1) VTVM (DC).
- (2) Short pin plugs (Accessories of pre-amplifier or Figure).

#### NOTE:

- (1) Align after five minutes when power has been supplied.

#### ALIGNMENT (For alignment point, See Figure 16.)

- (1) Connect test equipments as shown in Figure 14.
- (2) Short the input terminal with short pin plugs.
- (3) Adjust the SVR 501 (L ch), and SVR 502 (R ch) as the VTVM indicates 20mV DC.



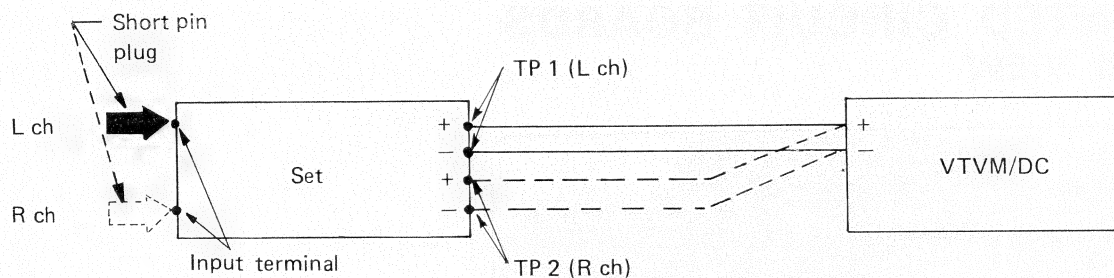


Figure 14

## METER INDICATION

### TEST EQUIPMENT

- (1) AF oscillator.
- (2) VTVM (AC).
- (3) Dummy loads (4 ohms above 1W).

### NOTE:

- (1) Don't short the speaker terminals.

### ALIGNMENT (For alignment point, See Figure 16.)

- (1) Set the meter range selector of peak-power-meter to xl ( ) position.
- (2) Set the speaker selector knob to SPEAKER A position.
- (3) Connect test equipment as shown in Figure 15.
- (4) Control the output of AF oscillator as the VTVM indicates 2V AC.
- (5) Adjust the indication of peak-power-meter to be 1W with SVR601 (L ch) and SVR602 (R ch).

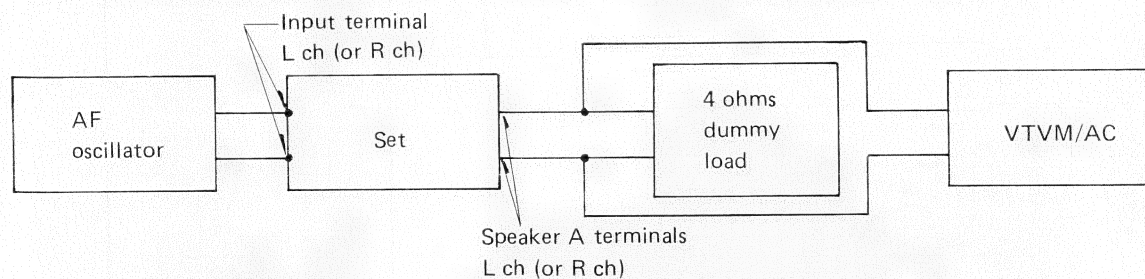


Figure 15

## ALIGNMENT POINTS

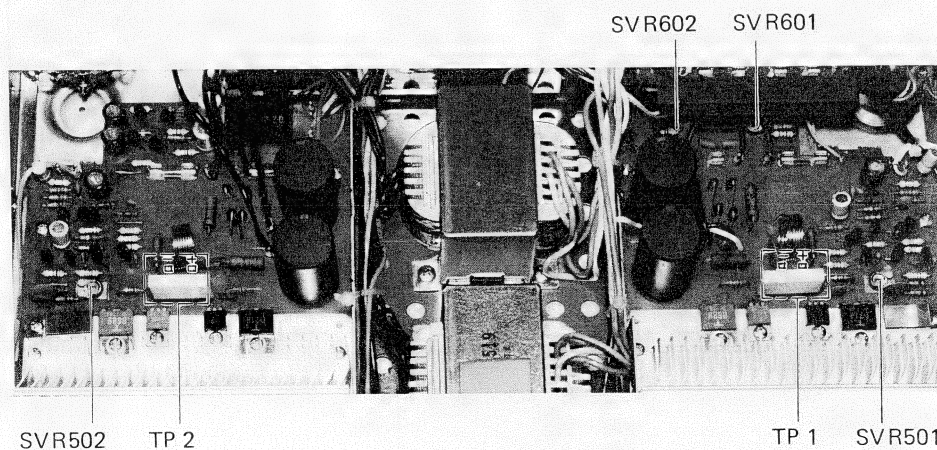
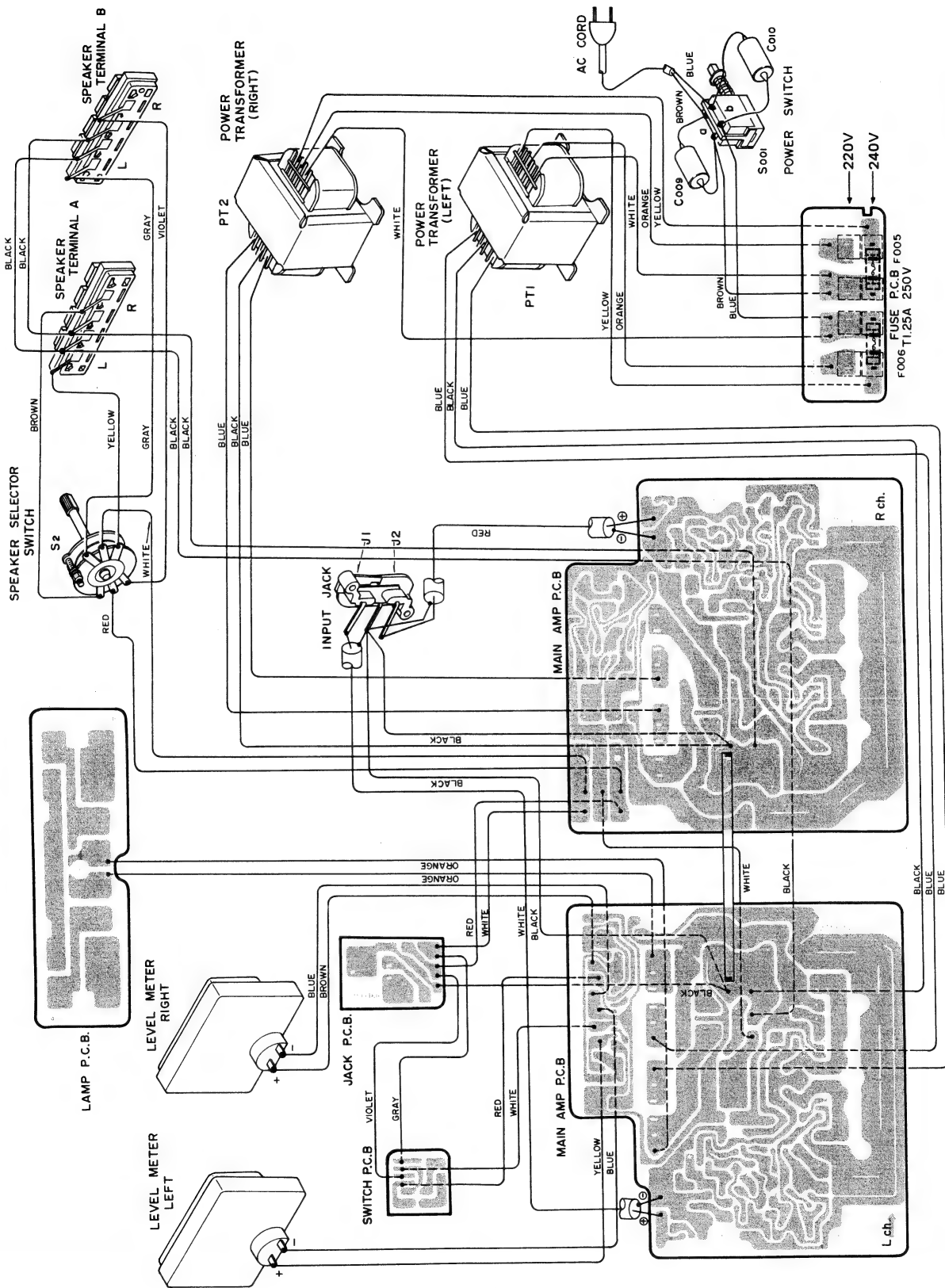


Figure 16



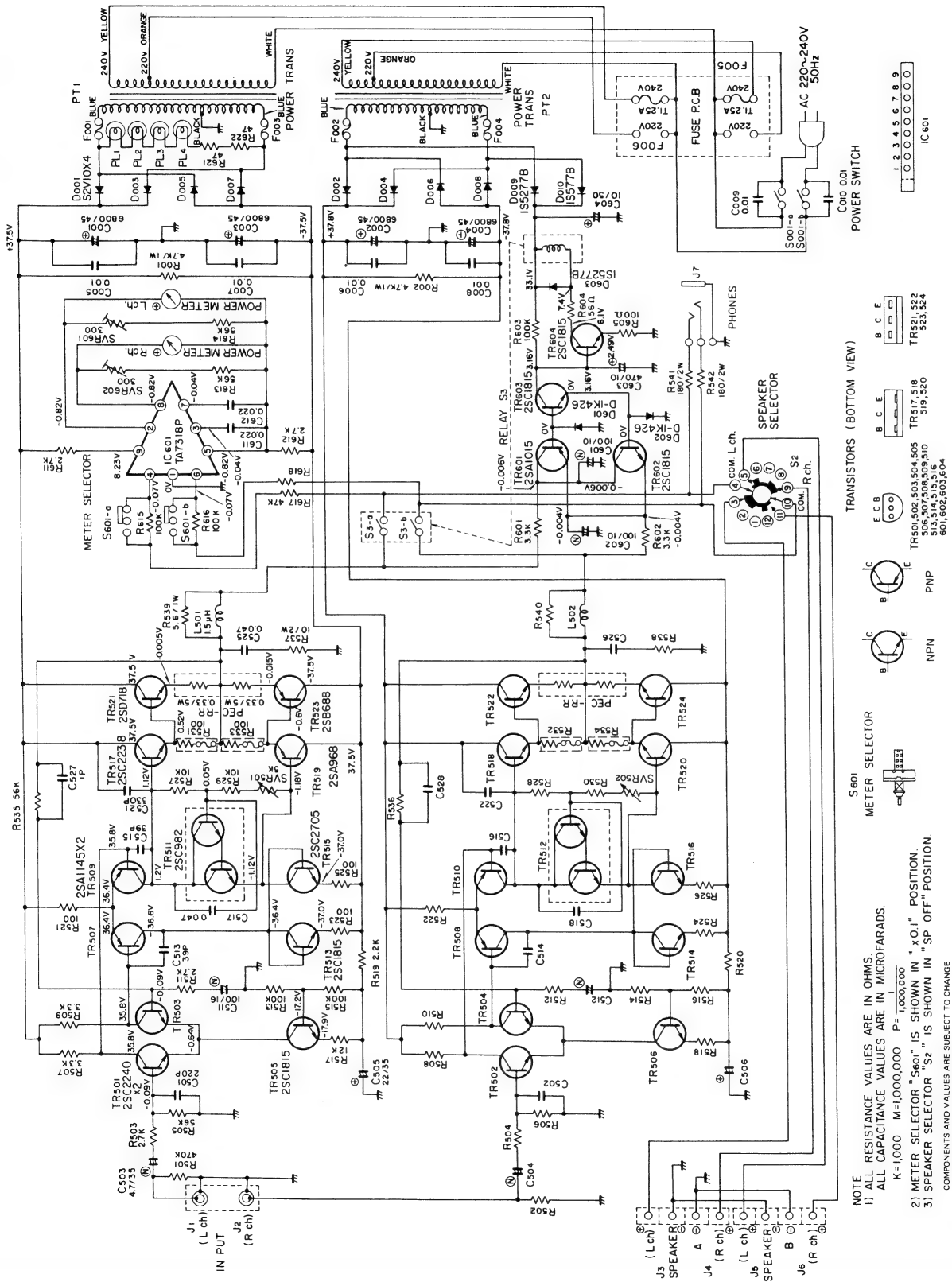


# **BOTTOM VIEW OF P.C.B AND WIRING**



TM2250

# 5. SCHEMATIC DIAGRAM





## EXPLODED VIEW PARTS

Symbol No.	Part No.	Description
1	20015797	Chassis
2	20735695	Bracket
3	20735697	Power Transformer Bracket
4	20848603	Top Cover
5	20713843	Front Panel
6	20848602	Indicator Cover
7	20779929	Name Plate
8	20743973	Button Guide
9	20874668	Push Button
10	20743974	Button Guide
11	20874667	Push Button
12	22772611	Spring
13	22756528	Cushion
14	22832822	Bottom Cover
15	20842649	Foot
16	20015803	Back Chassis
17	22754791	Cord Clamper
18	22184183	Cord Clamper
19	20754796	Indicator Plate
20	20746993	Meter Support
21	20872621	Selector Knob
22	22104503	Level Meter
23	22993614	Band
24	22755516	Clamper Lug
25	22756698	Cushion
26	22748840	Radiator
27	22906641	Voltage Label
28	22756862	Cushion
31	22176550	Power Cord
32	22748854	Shield Plate
33	22748855	Barrier
34	22748844	Reflector
35	20735696	Fuse Bracket
36	20754794	Earth Joint
37	20746920	Transistor Holder
38	22193157	Fuse P.C. Board
39	22193156	Pilot Lamp P.C. Board
40	22193155	AF P.C. Board (Left)
41	22193158	AF P.C. Board (Right)
<b>SCREWS AND RINGS</b>		
N1	70433006	Bind Head 3.0 x 6mm
N2	22701757	Bind Head 3.0 x 6mm
N3	70433008	Bind Head 3.0 x 8mm
N5	22701716	Bind Head 3.0 x 14mm

Symbol No.	Part No.	Description
N6	72633006	Bind Head Tapping 3.0 x 6mm
N7	72633008	Bind Head Tapping 3.0 x 8mm
N8	22701573	PAN Head 4.0x8mm with W/SW
N9	20795955	Bind Head 3.0x6mm with SW
N10	20795986	Bind Head 3.0x8mm with SW
N11	74022030	Lock Washer 3.0φ
N12	73653000	Nut 3.0
N13	70443006	Flat Head 3.0 x 6mm
N14	22701724	Bind Head Tapping 3.0 x 10mm
<b>ACCESSORIES</b>		
	22164836	US1P Plug Cord
	22953920	Owner's Manual
	22951862	Warranty Card

Symbol No.	Part No.	Description
C522	22361331	Ceramic 330 PF, J
C525	22342473	Ceramic 0.047 mfd, Z
C526	22342473	Ceramic 0.047 mfd, Z
C527	22361309	Ceramic 1 PF, D
C528	22361309	Ceramic 1 PF, D
C601	22403082	Electrolytic 100 mfd/16WV(N)
C602	22403082	Electrolytic 100 mfd/16WV(N)
C603	22443471	Electrolytic 470 mfd/10WV
C604	22440351	Electrolytic 10 mfd/50WV
C611	22371223	Mylar 0.022 mfd, J
C612	22371223	Mylar 0.022 mfd, J
<b>RESISTORS</b>		
All fixed resistors are ¼W, ±5%, carbon resistor unless otherwise noted.		
Tolerance: G: ±2%, J: ±5%, K: ±10%		
R001	22573472	Metal Oxide 4.7K ohm, 2W
R002	22573472	Metal Oxide 4.7K ohm, 2W
R501	22545474	470K ohm
R502	22545474	470K ohm
R503	22545272	2.7K ohm
R504	22545272	2.7K ohm
R505	22545563	56K ohm
R506	22545563	56K ohm
R507	22545332	3.3K ohm
R508	22545332	3.3K ohm
R509	22545332	3.3K ohm,
R510	22545332	3.3K ohm
R511	22570519	Metal Oxide 2.7K ohm, ¼W, G
R512	22570519	Metal Oxide 2.7K ohm, ¼W, G
R513	22545104	100K ohm
R514	22545104	100K ohm
R515	22545104	100K ohm
R516	22545104	100K ohm
R517	22545123	12K ohm
R518	22545123	12K ohm
R519	22545222	2.2K ohm
R520	22545222	2.2K ohm
R521	22545101	100 ohm
R522	22545101	100 ohm
R523	22545101	100 ohm
R524	22545101	100 ohm
R525	22545101	100 ohm
R526	22545101	100 ohm
R527	22545103	10K ohm
R528	22545103	10K ohm
R529	22545103	10K ohm
R530	22545103	10K ohm
R531	22500233	Fusible 100 ohm, ¼W, J
R532	22500233	Fusible 100 ohm, ¼W, J
R533	22500233	Fusible 100 ohm, ¼W, J
R534	22500233	Fusible 100 ohm, ¼W, J

Symbol No.	Part No.	Description
R535	22570538	Metal Oxide 56K ohm, ¼W, G
R536	22570538	Metal Oxide 56K ohm, ¼W, G
R537	22573100	Metal Oxide 10 ohm, 2W
R538	22573100	Metal Oxide 10 ohm, 2W
R539	22571569	Metal Oxide 5.6 ohm, 1W
R540	22571569	Metal Oxide 5.6 ohm, 1W
R541	22573181	Metal Oxide 180 ohm, 2W
R542	22573181	Metal Oxide 180 ohm, 2W
R601	22545332	3.3K ohm
R602	22545332	3.3K ohm
R603	22545104	100K ohm
R604	22545560	56 ohm
R605	22545101	100 ohm
R611	22571272	Metal Oxide 2.7K ohm, 1W
R612	22571272	Metal Oxide 2.7K ohm, 1W
R613	22545560	56 ohm
R614	22545560	56 ohm
R615	22545104	100K ohm
R616	22545104	100K ohm
R617	22545473	47K ohm
R618	22545473	47K ohm
R621	22573470	Metal Oxide 47 ohm, 2W
R622	22573470	Metal Oxide 47 ohm, 2W
SVR501	22658471	Semi-Fixed 5K ohm
SVR502	22658471	Semi-Fixed 5K ohm
SVR601	22658515	Semi-Fixed 300 ohm
SVR602	22658515	Semi-Fixed 300 ohm
<b>MISCELLANEOUS</b>		
L501	22211228	Choke Coil, AF
L502	22211228	Choke Coil, AF
S001	22140518	Push Switch (Power)
S601	22140612	Push Switch (Meter Selector)
S2	22140611	Rotary Switch(Speaker Selector)
S3	22148412	On the Relay
PEC-RR	22135030	Multiple Component
J1, J2	22163765	US2P Jack
J3, J4	22161517	4P Terminal
J5, J6	22161517	4P Terminal
J7	22163746	Jack 6.5φ
F001 ~ 004	22144263	Fuse 3.15A S
F005, 006	22144213	Fuse 1.25A T
	22165047	Fuse Holding Terminal
PL1, ~ 4	22113472	Pilot Lamp 0.055A/12V
PT1, 2	22223519	Power Transformer
	22176550	Power Cord
	22148412	Relay with S3
	22104503	Power Meter

# **PARTS LIST**

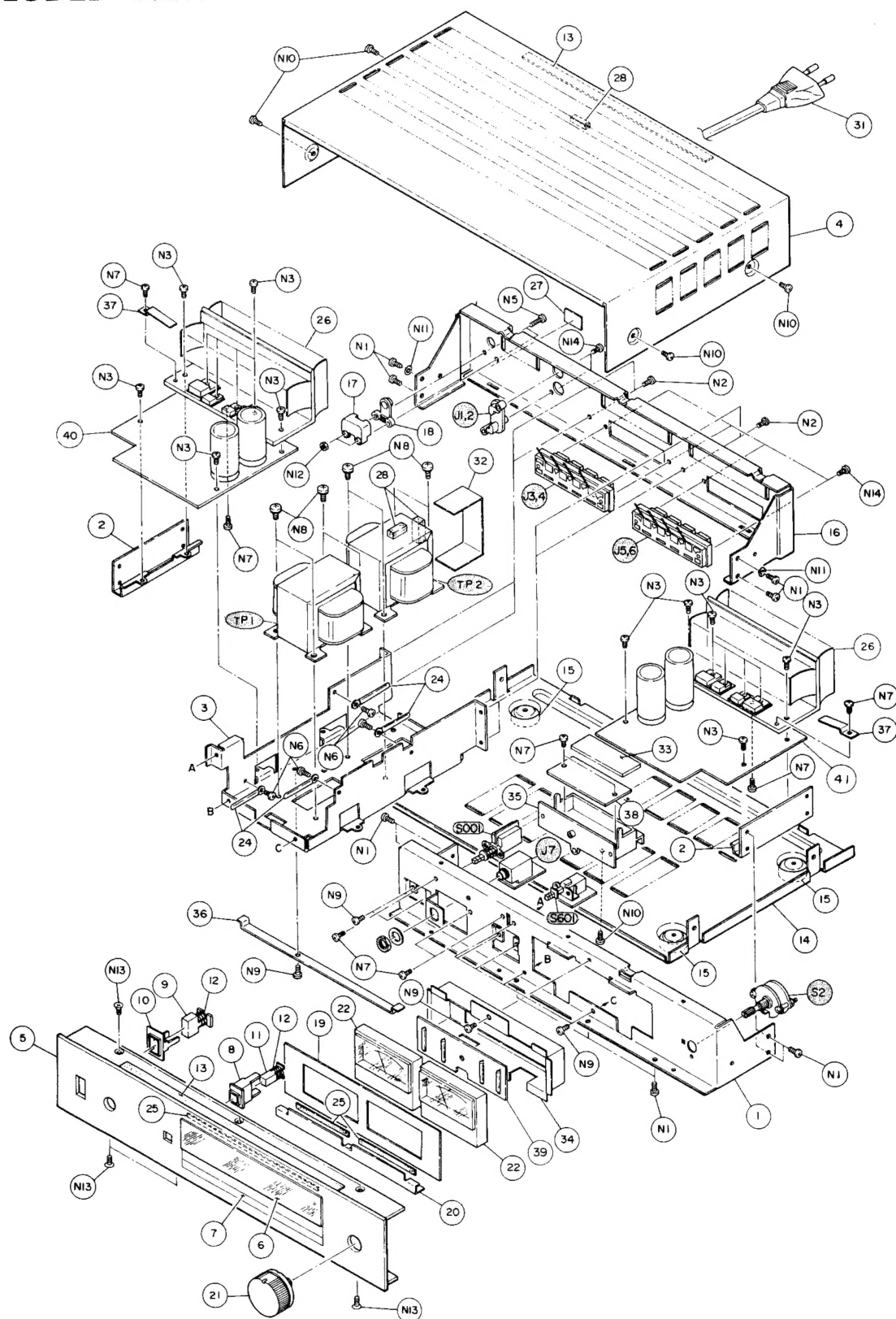
## **ELECTRICAL PARTS**


Symbol No.	Part No.	Description
<b>IC</b>		
IC601	40324050	IC, TA7318P
<b>TRANSISTORS &amp; DIODES</b>		
TR501	36325846	Transistor, 36325864-BL1
TR502	36325846	Transistor, 36325864-BL1
TR503	36325846	Transistor, 36325864-BL1
TR504	36325846	Transistor, 36325864-BL1
or		
TR501	36325847	Transistor, 36325847-BL2
TR502	36325847	Transistor, 36325847-BL2
TR503	36325847	Transistor, 36325847-BL2
TR504	36325847	Transistor, 36325847-BL2
or		
TR501	36325848	Transistor, 36325848-BL3
TR502	36325848	Transistor, 36325848-BL3
TR503	36325848	Transistor, 36325848-BL3
TR504	36325848	Transistor, 36325848-BL3
TR505	36317480	Transistor, 2SC1815-BL
TR506	36317480	Transistor, 2SC1815-BL
TR507	36540510	Transistor, 2SA1145-0
TR508	36540510	Transistor, 2SA1145-0
TR509	36540510	Transistor, 2SA1145-0
TR510	36540510	Transistor, 2SA1145-0
or		
TR507	36540520	Transistor, 2SA1145-Y
TR508	36540520	Transistor, 2SA1145-Y
TR509	36540520	Transistor, 2SA1145-Y
TR510	36540520	Transistor, 2SA1145-Y
TR511	36753140	Transistor, 2SC982TM
TR512	36753140	Transistor, 2SC982TM
TR513	36317480	Transistor, 2SC1815-BL
TR514	36317480	Transistor, 2SC1815-BL
TR515	36334810	Transistor, 2SC2705-0
TR516	36334810	Transistor, 2SC2705-0
or		
TR515	36334820	Transistor, 2SC2705-Y
TR516	36334820	Transistor, 2SC2705-Y
TR517	36325616	Transistor, 2SC2238-0
TR518	36325616	Transistor, 2SC2238-0
TR519	36533416	Transistor, 2SA968-0
TR520	36533416	Transistor, 2SA968-0
TR521	36845859	Transistor, 2SD718-0
TR522	36845859	Transistor, 2SD718-0
TR523	36625360	Transistor, 2SB688-0
TR524	36625360	Transistor, 2SB688-0
or		
TR517	36325620	Transistor, 2SC2238-Y
TR518	36325620	Transistor, 2SC2238-Y
TR519	36533425	Transistor, 2SA968-Y
TR520	36533425	Transistor, 2SA968-Y
TR521	36845836	Transistor, 2SD718-R

Symbol No.	Part No.	Description
TR522	36845836	Transistor, 2SD718-R
TR523	36625336	Transistor, 2SB688-R
TR524	36625336	Transistor, 2SB688-R
TR601	3653404A	Transistor, 2SA1015-Y or
	36534060	Transistor, 2SA1015-GR
TR602	36317480	Transistor, 2SC1815-BL
TR603	36317480	Transistor, 2SC1815-BL
TR604	36317480	Transistor, 2SC1815-BL
D001	22115564	Diode, S2V10-X
D002	22115564	Diode, S2V10-X
D003	22115564	Diode, S2V10-X
D004	22115564	Diode, S2V10-X
D005	22115564	Diode, S2V10-X
D006	22115564	Diode, S2V10-X
D007	22115564	Diode, S2V10-X
D008	22115564	Diode, S2V10-X
D009	37978380	Diode, 1S5277B
D010	37978380	Diode, 1S5277B
D601	22115415	Diode, 1K426A
D602	22115415	Diode, 1K426A
D603	37978380	Diode, 1S5277B
<b>CAPACITORS</b>		
Tolerance: D: $\pm 0.5$ PF, J: $\pm 5\%$ , K: $\pm 10\%$ , M: $\pm 20\%$ , P: +100 to -0%, Z: +80 to -20%, G: $\pm 2\%$ (N): Nonpolarity type		
C001	22440324	Electrolytic 6800 mfd/45WV
C002	22440324	Electrolytic 6800 mfd/45WV
C003	22440324	Electrolytic 6800 mfd/45WV
C004	22440324	Electrolytic 6800 mfd/45WV
C005	22342103	Ceramic 0.01 mfd, Z
C006	22342103	Ceramic 0.01 mfd, Z
C007	22342103	Ceramic 0.01 mfd, Z
C008	22342103	Ceramic 0.01 mfd, Z
C009	22303024	Oil-Filled 0.01 mfd/450WV
C010	22303024	Oil-Filled 0.01 mfd/450WV
C501	22361221	Ceramic 220 PF, J
C502	22361221	Ceramic 220 PF, J
C503	22403080	Electrolytic 4.7 mfd/35WV(N)
C504	22403080	Electrolytic 4.7 mfd/35WV(N)
C505	22447220	Electrolytic 22 mfd/35WV
C506	22447220	Electrolytic 22 mfd/35WV
C511	22403082	Electrolytic 100 mfd/16WV(N)
C512	22403082	Electrolytic 100 mfd/16WV(N)
C513	22361390	Ceramic 39 PF, J
C514	22361390	Ceramic 39 PF, J
C515	22361390	Ceramic 39 PF, J
C516	22361390	Ceramic 39 PF, J
C517	22342473	Ceramic 0.047 mfd, Z
C518	22342473	Ceramic 0.047 mfd, Z
C521	22361331	Ceramic 330 PF, J

## 6. EXPLODED VIEW AND PARTS LISTS

### EXPLODED VIEW



The parts marked , see the electrical parts list.